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# HELMINTHOLOGICAL ABSTRACTS

*incorporating*

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### BIBLIOGRAPHY OF HELMINTHOLOGY

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Commonwealth Agricultural Bureaux, 1959



# HELMINTHOLOGICAL ABSTRACTS

INCORPORATING BIBLIOGRAPHY OF HELMINTHOLOGY

FOR THE YEAR 1958

Vol. 27, Part 2

## 75—Acta Medica Scandinavica.

- a. BRANTE, G. & ERNBERG, T., 1958.—“The mechanism of pernicious tapeworm anemia studied with  $^{60}\text{Co}$ -labelled vitamin  $\text{B}_{12}$ .” **160** (2), 91-98.

(75a) Brante & Ernberg studied the fate of  $\text{Co}^{60}$ -labelled vitamin  $\text{B}_{12}$  in two patients infected with *Diphyllobothrium latum*. In one patient who had free hydrochloric acid and intrinsic factor in her gastric juice, a dose given *per os* did not cause the accumulation of radioactivity in the region of the liver. Parenteral injection of unlabelled vitamin to both patients following doses of labelled vitamin given *per os* (Schilling's test) caused only subnormal excretion in the urine. The excretion was normal if the labelled vitamin was mixed with intrinsic factor before it was given *per os* in the Schilling test. Worms expelled two months later still contained  $\text{Co}^{60}$ . The authors consider that the worms probably could not take up vitamin  $\text{B}_{12}$  bound to the intrinsic factor. W.P.R.

## 76—Agricultural Chemicals. Baltimore.

- a. YOUNG, V. H., 1958.—“Activity of VC-13 nemacide, a non-fumigant type nematocide.” **13** (2), 30-31.

(76a) The properties of VC-13 nemacide, a non-fumigant type of nematocide, are given. The active component is O-2,4-dichlorophenyl-O,O-diethyl phosphorothioate. This nematocide has little phytotoxicity and persists in the soil for a longer time than the fumigant type of nematocides. However, VC-13 nemacide does not kill nematodes as quickly as the fumigants. It is recommended as a pre- and post-planting treatment for general nematode control except the cyst-forming species. H.R.W.

## 77—Agricultural Gazette of New South Wales.

- a. BLAKE, C. D., 1958.—“Plant parasitic nematodes.” **69** (7), 360-365.  
b. ANON., 1958.—“Diseases of carrots.” **69** (8), 415-418.

(77b) In this general account of diseases affecting carrots in New South Wales, brief mention is made of root-knot caused by *Meloidogyne*. This is of importance on sandy soils during the warmer months of the year. The use of sweet-corn and vegetables of the onion family in crop rotations reduces the number of eelworms in the soil. S.W.

## 78—Agriculture. London.

- a. OLLERENSHAW, C. B., 1958.—“Climate and liver fluke.” **65** (5), 231-235.

(78a) Ollerenshaw stresses the combination of temperatures above  $50^{\circ}\text{C}$ . with adequate moisture as providing suitable conditions for the development of the sheep liver-fluke. The critical temperature is normally only exceeded between May and October; and development, which requires 10 to 15 weeks, takes place only when rainfall exceeds evaporation and the soil therefore attains field capacity. Normally field capacity is only reached in autumn, winter and early spring, when temperature conditions are unsuitable for the development of the parasite



in the snail host. However, wet summers do occur, and it is in such years that outbreaks of fluke disease can be expected. The geographical distribution of liver-fluke in the United Kingdom can be explained on the basis of three differing climatic patterns in different parts of the country. The first pattern occurs in south-east and south England where three wet months rarely occur in the period May to October. Little fluke disease occurs in such areas. The second pattern occurs in hill country in England, Scotland and Wales, where there is high rainfall and all the months are wet. Fluke infection is patchy because the snails are limited to small, localized habitats by the acid and mineral-poor conditions in the soil. The third pattern occurs in lowland areas of the west of England and Wales, and varies between the two extremes. Fluke disease is to be expected in areas with this pattern. The constant wetness of September and October makes it possible to forecast the occurrence of fluke disease with some accuracy. If one additional summer month is wet a severe epidemic may be expected to follow. Improved methods of control may be devised as a result of the forecast system. J.M.W.

### 79—American Journal of Hygiene.

- a. HALEY, A. J., 1958.—“Host specificity of the rat nematode, *Nippostrongylus muris*.” 67 (3), 331-349.
- b. SENTERFIT, L. B., 1958.—“Immobilization of the miracidia of *Schistosoma mansoni* by immune sera. I. The nature of the reaction as studied in hamster sera.” 68 (2), 140-147.
- c. SENTERFIT, L. B., 1958.—“Immobilization of the miracidia of *Schistosoma mansoni* by immune sera. II. The occurrence of the antibody during the course of schistosomiasis.” 68 (2), 148-155.

(79a) The author shows that on the average rats can support 13 times as many adult *Nippostrongylus muris* as hamsters, when both are infected with similar doses of a rat strain. The infectivity for hamsters can be increased by continuous passage through hamsters. There is also some variation in the worm burden supported by the two sexes. Male hamsters supported 25 times as many worms as did females. It was concluded that the make-up of the parasite and the proportion of different types present in a given population were vital factors in determining the specificity of the host-parasite relationships considered. K.H.

(79b) Senterfit reports experimental evidence for the antigen-antibody nature of the reaction in the case of the immobilization of *Schistosoma mansoni* miracidia by immune serum which he had previously described [for abstract see Helm. Abs., 22, No. 633a]. Immobilizing activity appeared in the sera of hamsters injected with antigen adjuvant emulsions prepared from various stages of the parasite; and this property could be absorbed from these sera by dry, powdered adult worms, cercariae or eggs. The author concludes that the antigen is present in all stages of the parasite found in the mammalian host, and that the immobilization reaction is due to an antibody. J.M.W.

(79c) Continuing his investigations on the immobilization of miracidia of *Schistosoma mansoni* by immune sera, Senterfit reports on the time of appearance and specificity of this reaction and compares its relative activity with that of some other *in vitro* reactions susceptible of quantitative assessment. The miracidial immobilization reaction became positive in the serum of experimentally infected monkeys at approximately the same time as the cercarial agglutination and circumoval precipitate reactions. In human sera the immobilization of miracidia showed correlation with the cercarial agglutination titres, but not with the circumoval precipitate or the circumcercarial precipitate. Production of antibodies to the miracidia and cercariae, unaccompanied by antibody to the egg, was stimulated by infections in hamsters of either male or female schistosomes. The level of immobilizing antibody was high during acute infection and lower or absent in chronic infections of both monkey and man. The specificity of the immobilization reaction was tested in sera from human and laboratory infections with *Trichinella spiralis* and from individuals infected with *Paragonimus westermani*, *Trichuris trichiura* and hookworm [species not stated]. Antibodies to the miracidia were present only in the case of *Trichinella spiralis* infection. The immobilizing antibody has not been demonstrated to be related to resistance of the host. Further study is indicated. J.M.W.



**80—American Journal of Tropical Medicine and Hygiene.**

- a. LIE KIAN JOE, CHOW, C. Y., WINOTO, R. M. P., SOEGIARTO & RUSAD, M., 1958.—“ Filariasis in Djakarta, Indonesia.” **7** (3), 280–284.
- b. KAGAN, I. G. & MERANZE, D. R., 1958.—“ The histopathology of experimental infections in mice with *Schistosomatum douthitti*.” **7** (3), 285–293.
- c. MOON, A. P., FRICK, L. P. & ASAKURA, S., 1958.—“ Laboratory screening of compounds for molluscicidal activity against *Oncomelania nosophora* with an immersion test and a modified plate test.” **7** (3), 295–297.
- d. KUNTZ, R. E., LAWLESS, D. K. & LANGBEHN, H. R., 1958.—“ Intestinal protozoa and helminths in the peoples of western (Anatolia) Turkey.” **7** (3), 298–301.

(80a) In an area in the crowded kampung quarters of Djakarta, Indonesia, microfilariae of *Wuchereria bancrofti* were found in the night blood of 7·8% of 7,048 persons and in 10·4% of 4,311 individuals who had lived there for more than three years. Acute filariasis and elephantiasis were not seen. A survey of 324 people in part of the area showed filarial infection in 11·8%, filarial disease in 3·3% and an endemicity rate of 14·4%. 180 were found infected at the General Centre Hospital of Djakarta and their living quarters were more or less evenly distributed throughout the kampungs. It is concluded that *W. bancrofti* of the nocturnal type is endemic in these areas of Djakarta.

M.MCK.

(80b) Mice were given unisexual or bisexual infections of *Schistosomatum douthitti* or were given two infections, 60 days apart. A few were infected with *Schistosoma mansoni* and *S. japonicum*. In *Peromyscus maniculatus* the inflammatory reaction to the eggs in the spleen was not as intense as that seen in white mice due to the presence of eggs of *Schistosomatum douthitti* or *Schistosoma mansoni*. The reactions were of three general types: (i) one mouse infected with *S. mansoni* had two typical pseudotubercles around isolated eggs; (ii) mice infected with *Schistosomatum douthitti* showed no marked circumscription of connective tissue; and (iii) in *P. maniculatus* infected with *S. douthitti* the eggs were surrounded by inflammatory cells after 626 days but there were no pseudotubercles. In the intestine the eggs and inflammatory response were confined to the submucosa and muscle layers, and there was marked thickening of the inner muscle layer after 120 days. The bone marrow showed, unexpectedly, little reaction but in the lungs inflammatory nodules were seen surrounding the eggs 60 days after infection.

M.MCK.

(80c) A method of molluscicidal testing by an immersion test is described and the results of screening 89 compounds by this technique are compared with results obtained by a modification of the plate test, as described by McMullen in 1949 and 1951 [for abstracts see Helm. Abs., 18, No. 405bs and 20, No. 625]. In the immersion test, ten *Oncomelania nosophora* were introduced into solutions or suspensions of the test chemical at concentrations of 1·25, 2·5, 5·0 and 10·0 parts per million. The snails were completely immersed for six hours, then rinsed several times with distilled water and left in petri dishes for 66 hours. They were then crushed to determine the number of snails alive at this time. In both immersion and plate tests the molluscicide controls were sodium pentachlorophenate and dinitro-o-cyclo-hexylphenol. It is considered that the immersion test is more sensitive than the plate test, that observation of toxic effect is more reproducible and that several variables inherent in the plate test are eliminated. Of 24 chemicals shown to possess an LD<sub>50</sub> of less than 5 p.p.m. by immersion test or 100 p.p.m. by plate test, four had a lower LD<sub>50</sub> than the control chemicals. Of these, three gave poor results in field tests. The fourth, CP 4737, is recommended for field trials. O.D.S.

(80d) Kuntz *et al.*, using the MIF and formalin preservation methods and the AMS III concentration technique, examined the faeces of 349 Turkish soldiers, 18 to 30 years old encamped in, but not necessarily natives of, four areas—Istanbul, Sapanca, Bolu and Ankara. Evidence of 19 species of helminth parasites was found. *Ascaris lumbricoides* and *Trichuris trichiura* predominated, showing an incidence in the neighbourhood of 40% to 50% respectively. Ova of *Enterobius vermicularis*, hookworm, *Trichostrongylus* spp., *Taenia* spp. and *Diphyllobothrium latum* occurred in relatively few faecal specimens (1·5 to 2·3%). Eggs of *Heterodera* sp. were seen in 14 samples from Sapanca. *Strongyloides stercoralis* juveniles occurred in one



## 80—American Journal of Tropical Medicine and Hygiene (cont.)

- e. SWARTZWELDER, J. C., LAMPERT, R., MILLER, J. H., SAPPENFIELD, R. W., FRYE, W. W., ABADIE, S. H. & COCO, L. J., 1958.—“Therapy of trichuriasis and ascariasis with dithiazanine.” 7 (3), 329–333.
- f. KUNTZ, R. E. & LAWLESS, D. K., 1958.—“Acquisition of intestinal protozoa and helminths by young children in a typical village of lower Egypt.” 7 (4), 353–357.
- g. ROWAN, W. B., 1958.—“Daily periodicity of *Schistosoma mansoni* cercariae in Puerto Rican waters.” 7 (4), 374–381.

sample, ova of *Hymenolepis diminuta* and *H. nana* in two each, ova of *Heterophyes taichui* in three and of *H. heterophyes* in seven. *Dicrocoelium dendriticum* ova occurred in more than 40% of stools from Istanbul and Ankara, but were probably spurious infections; as were also the six cases in which *Fasciola* sp. occurred. *Fasciolopsis buski* and *Clonorchis sinensis* eggs were found in the stools of two men who had served in the Korean campaign. Four *Schistosoma mansoni* infections were probably contracted as the result of pilgrimage to Mecca. Relatively few individuals (19.2%) harboured no helminths. J.M.W.

(80e) Swartzwelder *et al.* carried out clinical trials of the new broad-spectrum anthelmintic dithiazanine (3-3', diethylthiadycarbocyanine) and found it to be an effective oral therapeutic agent for both clinical and subclinical trichuriasis and ascariasis, and for mixed infections. No serious side effects were encountered in any of the cases treated, the only adverse reactions being vomiting in a small number of patients. The most effective dosage was found to be 20 mg. per lb. body-weight, with a maximum of 600 mg. per day, given in divided doses three times daily for five or more days depending on the intensity and severity of the infection. In 36 cases of trichuriasis in children subjected to individual therapy there was a 98.2% reduction in total egg count and complete parasitic cure occurred in 72% of cases. In 262 persons subjected to mass therapy, of whom 201 were infected with *Trichuris trichiura*, there was almost a 100% reduction in total egg count and complete parasitic cure in 97% of cases. Complete parasitic cure was also obtained in 65% of 37 cases of ascariasis with a 96.2% reduction in total egg count. Complete clinical cure was obtained in all cases. J.M.W.

(80f) In the Nile Delta village of Sindbis, Kuntz & Lawless carried out a systematic series of faecal examinations of very young children falling within the following age groups: (i) one to six months; (ii) 13 to 24 months; (iii) 26 to 47 months. The object of the study was to determine the approximate ages at which the different members of the intestinal fauna become established in a village population. No helminths were found in the youngest age group. Study of the intermediate group, in whose faeces eggs of *Ascaris lumbricoides*, *Enterobius vermicularis* and *Hymenolepis nana* made their appearance, indicated that the period from eight to 20 months of age was the most important from the standpoint of establishment of intestinal fauna. In the oldest group helminth populations increased markedly; eggs of hookworm and *Trichuris* appeared in the faeces; and no children escaped helminthic infection. Schistosome eggs were not seen although Sindbis lies in an area endemic for both *Schistosoma mansoni* and *S. haematobium*. J.M.W.

(80g) Rowan describes a method for rapid determination of the numbers of cercariae present in samples of water taken from lakes and rivers. The cercaria recovery device (illustrated) consisted of a pressure filtration chamber connected by a rubber hose to a manually operated water pump. Water is forced through selected grades of filter-paper (S and S 404) which trap cercariae, silt, zooplankton and other suspended matter. When the desired volume of water has accumulated in the filtrate reservoir and only air remains in the filtration chamber, the damp filter-paper is transferred to a shallow pan containing 5 ml. of 0.5% ninhydrin reagent and heated until dry. Details are recorded on the dry paper which can be studied under a dissecting microscope after any interval by placing it between glass plates and saturating it with xylol containing excess sodium bicarbonate. Rowan then presents data which show that the number of *Schistosoma mansoni* cercariae present varies considerably during the day, reaching a peak between 11 a.m. and 1 p.m. and being relatively low before 9 a.m. or after 4 p.m. A minimum density is attained between 5 a.m. and 9 a.m. The author notes that in families which wash, bathe or draw water at these hours there is a relatively low rate of infection. P.K.



## 80—American Journal of Tropical Medicine and Hygiene (cont.)

- h. MALDONADO, J. F. & OLIVER-GONZÁLEZ, J., 1958.—“The prevalence of *Schistosoma mansoni* in certain localities of Puerto Rico—a three year study.” 7 (4), 386–391.
- i. MACDONALD, E. M. & SCOTT, J. A., 1958.—“The persistence of acquired immunity to the filarial worm of the cotton rat.” 7 (4), 419–422.
- j. LEE, R. D. & PARMELEE, W. E., 1958.—“Thelaziasis in man.” 7 (4), 427–428.
- k. FERGUSON, F. F., OLIVER-GONZÁLEZ, J. & PALMER, J. R., 1958.—“Potential for biological control of *Australorbis glabratus*, the intermediate host of Puerto Rican schistosomiasis.” 7 (5), 491–493.
- l. SADUN, E. H., LIN, S. S. & WILLIAMS, J. E., 1958.—“Studies on the host parasite relationships to *Schistosoma japonicum*. I. The effect of single graded infections and the route of migration of schistosomula.” 7 (5), 494–499.

(80h) Maldonado & Oliver-González examined 23,262 faecal samples from individuals in six recognized foci of schistosomiasis in Puerto Rico over the period 1953 to 1957. Despite the absence of any general control measures or treatment campaigns the average prevalence of schistosomiasis mansoni in the six areas declined from 22% to 11% during the period at issue. Infection was more frequent in males than in females and was highest in the group ten to 20 years old.

J.M.W.

(80i) Macdonald & Scott report experimental proof of the persistence, for one or two years after the introduction of the primary infection, of the retarding effect on growth and development of secondary infections of *Litomosoides carinii* in cotton-rats produced by a pre-existing primary infection. They also record the persistence of such immunity for a considerable time after the death of the primary infecting worms. More critical experiments are needed to determine whether this immunity is established at the time of introduction of the primary infection and persists for these long periods without reinforcement, or whether the adult worms and, later, the deposits of dead worm tissue, continue to exert an antigenic effect. The term “postmunity” is suggested for a condition of resistance, initially induced by infection, which is prolonged by the presence of dead or dying material from the parasites.

J.M.W.

(80j) Lee & Parmelee refer to the 12 existing reports (nine from Asia, three from North America) in the literature of infection of the human eye with species of the genus *Thelazia*. They add data on three additional cases from North America; suggest that human thelaziasis is commoner than the paucity of published case reports indicates; and conclude with an appeal to readers to send them information on any cases seen.

J.M.W.

(80k) Ferguson, Oliver-González & Palmer present a report on the progress of the scheme in Puerto Rico to introduce the snail *Marisa cornuarietis* as an agent to control *Australorbis glabratus*. Of ten ponds in which *Marisa* was successfully established, eight were originally infested with *A. glabratus* and in all of them this species had disappeared after two years. In one watershed where *A. glabratus* was common *Marisa* has become successfully established and in less than two years has gradually replaced the planorbid. Areas treated with sodium pentachlorophenate are now being subsequently “planted” with *Marisa* to prevent the return of *Australorbis*. Mention is made of the possible use of *Helisoma duryi* (another planorbid) and the melaniid *Tarebia granifera* as competitors against *Australorbis*, and an unidentified species of *Ampullaria* is noted to be ineffective.

C.W.

(80l) Sadun *et al.* describe investigations on the effect of single infections with varied doses of *Schistosoma japonicum* cercariae on mice survival, and also on whether the schistosomulae reach their final sites through the circulatory system or through tissue migration. Both young male adults and suckling mice were used; the cercarial dosage varied from 20 to 300; and infection by both sexes was ensured. For single graded infections the mice were killed after nine weeks, and for migration studies, at 24-hour intervals. In single infections, most animals dying before the fifth week were in the groups exposed to very high doses, and the apparent cause of death was blockage of the blood-vessels by large numbers of young adult worms. In those surviving milder doses the vessels were not blocked but the liver and



**80—American Journal of Tropical Medicine and Hygiene (cont.)**

- m. SADUN, E. H. & WALTON, B. C., 1958.—“Studies on the host parasite relationships to *Schistosoma japonicum*. II. Quantitative changes in the concentration of serum proteins in humans and rabbits.” **7** (5), 500–504.
- n. MILLER, M. J., 1958.—“An evaluation of the skin scarification technic for the recovery of microfilariae of *Onchocerca volvulus*.” **7** (5), 554–557.
- o. MILLER, M. J. & FRANZ, K. N., 1958.—“Some clinical aspects of onchocerciasis in Liberia.” **7** (5), 558–560.

intestine showed large numbers of eggs. More male than female worms were recovered. Migration studies showed that most of the worms appeared to migrate from the lungs to the liver by the blood-vessels, this being confirmed by the brief period taken to reach the liver (three to four days) and by the fact that very few schistosomulae were found in the pleural and peritoneal cavities. However the young worms were not generally found in the portal vein and the authors suggest that (i) most reach the liver through the blood circulation, but after reaching the portal vein they migrate through the parenchyma and/or the portal-hepatic vein anastomoses to the central vein and back again; and (ii) some young worms penetrate the parenchyma through the anterior surface of the liver. No explanation is given of the lack of liver damage in the first case. More males than females were recovered when the animals were infected by pooling cercariae from a large number of infected snails. W.K.D.

(80m) Sadun & Walton report the results of paper electrophoresis tests on sera from rabbits artificially infected, and from naturally infected humans, with controls. Young adult male rabbits were exposed to infection by from 250 to 1,000 *Schistosoma japonicum* cercariae of both sexes. The animals were killed after six months and the worms counted. 134 sera from control and infected rabbits were tested. From the 45th day the total protein was greatly increased, and a sudden and marked increase in  $\gamma$ -globulin, with decreased albumin and  $\alpha$ -2 globulin, resulting in a striking decrease in the albumin-globulin ratio. Three lots of human sera were tested from: (i) 39 patients with *S. japonicum* infection; (ii) 14 Japanese living in a non-endemic area who had never been exposed to infection; (iii) ten Americans who had also never been exposed to infection. The results showed a significant increase in total protein,  $\alpha$ -1, and  $\gamma$ -globulins, with decreased albumin. The authors could not decide whether the marked  $\gamma$ -globulin increase was due primarily to liver damage or to antibody production, and suggest that comparative study of the relation of serum transaminase, serology, and serum electrophoresis may throw some light on the relative importance of cercariae, ova, and adult worms in the pathogenesis of the disease. W.K.D.

(80n) The cases of onchocerciasis studied came from the treatment clinic of the Liberian Institute. All were adults of both sexes who worked at the Firestone Plantations. The skin was scarified by making five superficial linear cuts about 1 mm. to 2 mm. long and 1 mm. apart with a razor blade, the blood and tissue juices being then expressed on to slides and stained with Giemsa. The scarifications were made at various sites to test comparative numbers of microfilariae; four sites were above the pelvis and three below and the latter showed much the higher concentrations. In higher intensity infections the extensor surfaces were more positive and smears taken from closely placed sites on consecutive days showed considerable variation, though this was probably due to technique. The author suggests that a minimum of four smears, one from each hip and calf, should be examined. He concludes that, though the efficacy of skin scarification increases with higher density, with low density infections the skin biopsy method will be relatively more efficient. W.K.D.

(80o) This report is an attempt to relate infection to clinical signs and symptoms, especially skin changes. 125 adults (81 males and 44 females) who lived in an onchocerciasis endemic area were examined for skin changes, nodules, by slit lamp, and by ophthalmoscope; and in addition the incidence of hydroceles and abortions was investigated. Infection was diagnosed by skin scarification and palpation of nodules, 14 skin smears being taken from each patient from seven different sites ranging from the temple to the ankle. 67 individuals were positive for microfilariae, while 19 more showed nodules. The total incidence was thus 69%,



equally distributed between the sexes. Nine out of 125 persons showed definite skin changes, which were more prominent in older individuals. Ocular lesions were not seen at all. Free-swimming microfilariae were not observed. In the cases with nodules which were negative for microfilariae, the latter were detected in the excised nodules or the nodule aspirate. Nine patients with rough atrophic "lizard" skin were all positive for microfilariae; and the authors suggest that these skin changes are due to the presence of the parasite. The incidence of hydroceles and abortions was the same in uninfected as infected persons.

W.K.D.

### 81—American Journal of Veterinary Research.

- a. RICHARDSON, T. & TODD, A. C., 1958.—"Elimination of phenothiazine by lactating dairy cows." **19** (72), 610-619.
- b. ROHRBACHER, Jr., G. H., PORTER, D. A. & HERLICH, H., 1958.—"The effect of milk in the diet of calves and rabbits upon the development of trichostrongylid nematodes." **19** (72), 625-631.
- c. SEGHETTI, L. & SENGER, C. M., 1958.—"Experimental infections in lambs with *Nematodirus spathiger*." **19** (72), 642-644.
- d. KUME, S., 1958.—"Prophylactic therapy against the developing stages of *Dirofilaria immitis* before reaching the canine heart." **19** (72), 675-676.

(81a) After briefly reviewing the pharmacology and derivatives of phenothiazine with special reference to its absorption and elimination in domestic animals, Richardson & Todd describe the results of analysis of the faeces, urine and milk of lactating dairy cows given 100 gm. of the drug each. The amount of phenothiazine eliminated in the milk of treated animals was small (less than 0.3%) and was mainly in the form of a phenothiazone derivative. Pooled milk samples from eight cows on a daily 2 gm. dosage schedule failed to give a positive test for phenothiazone, indicating the presence of less than 2 p.p.m. of this derivative in the milk. Such milk soured readily but could be successfully made into cheese. Essentially unchanged phenothiazine was eliminated in the faeces, ranging from 54.3% to 62.4% of the total administered; while a phenothiazone ethereal sulphate representing from 19.0% to 22.7% of the total administered was eliminated in the urine. Elimination in milk continued through 71 to 87 hours, in faeces about 75 hours and in urine from 112 to 133½ hours. Evidence was found that substantially more phenothiazine was eliminated in the milk of cows given the micronized drug as a powder in capsules than in the milk of cows given the drug in boluses.

J.M.W.

(81b) Rohrbacher *et al.* present experimental evidence to show that a diet composed exclusively of milk has a detrimental effect on the development of trichostrongylid nematodes, manifest in smaller numbers and reduced size. This effect may be due, in the case of *Haemonchus placei* infection in calves, in part to the presence of calcium in the milk and in part to the tendency of the milk to neutralize the acidity of the abomasum. Fewer *H. placei*, *Cooperia* spp. and *Oesophagostomum radiatum* were recovered from unweaned than from weaned calves; but weaning of the host apparently had no effect on *Ostertagia ostertagi*, *Trichostrongylus axei* and *T. colubriformis*. In rabbits, on the other hand, significantly smaller numbers of *T. axei* and *T. colubriformis* were recovered from unweaned than from weaned animals.

J.M.W.

(81c) Seghetti & Senger investigated the pathogenicity of *Nematodirus spathiger*. They found that experimental infection *per os* with third-stage infective larvae produced mortality in young lambs and failure to gain weight normally in older animals. About 50,000 infective larvae will cause death in lambs 1.5 months old and 80,000 in lambs two to three months old. Lambs older than three months are markedly resistant to the infection, showing only transient diarrhoea and weight loss varying with the severity of the infection.

J.M.W.

(81d) Kume found that antimony (given as antimony pyrogallol sulphonate), in twice the microfilaricidal dose, prevented the development of *Dirofilaria immitis* in experimentally infected dogs. He claims that this is the first concrete evidence that any therapeutic agent is prophylactic in dirofilariasis.

J.M.W.



## 82—Annales de Parasitologie Humaine et Comparée.

- a. ANDERSON, R. C., 1958.—“Méthode pour l'examen des nématodes en vue apicale.” **33** (1/2), 171–172.
- b. ANDERSON, R. C., 1958.—“Remarques sur la classification de la famille des Stephanofilariidae (Nematoda—Filarioidea).” **33** (1/2), 173–175.
- c. DOLLFUS, R. P., 1958.—“*Opisthioglyphe endoloba* (F. Dujardin 1845) est une espèce distincte d'*Opisthioglyphe ranae* (Froelich 1791) A. Looss 1907.” **33** (3), 218–226.
- d. DOLLFUS, R. P., 1958.—“Sur *Macraspis cristata* (E. C. Faust et C. C. Tang 1936) H. W. Manter 1936 et sur une émendation nécessaire à ma définition de la famille des Aspidogastridae (Trematoda).” **33** (3), 227–231.
- e. DOLLFUS, R. P. & CAPRON, A., 1958.—“Sur une espèce monorchide du genre *Renicola* L. Cohn 1903, parasite d'un accipitriforme d'Afrique Occidentale.” **33** (3), 232–239.
- f. GRÉTILLAT, S., 1958.—“Maintien du genre *Bothriophoron* Stiles et Goldberger, 1910, et valeur de l'espèce *Paramphistomum bothriophoron* (Braun, 1892) Fiscoeder, 1901 (Trematoda, Paramphistomatidae), parasite du réticulum du zébu malgache.” **33** (3), 240–253.
- g. ANDERSON, R. C. & CHABAUD, A. G., 1958.—“Taxonomie de la filaire *Squamofilaria sicki* (Strachan 1957) n. comb. et place du genre *Squamofilaria* Schmerling, 1925 dans la sous-famille Aprocinae.” **33** (3), 254–266.

(82a) A method is described for mounting the tip of a nematode to obtain an apical view. The decapitated end is manipulated under the binocular microscope in a small drop of warmed glycerine jelly on a fine cover slip until the anterior tip touches the surface of the cover slip. The slip is inverted and transferred to a slide where it rests on two very fine parallel glass rods of such diameter that the drop is just suspended between slide and cover slip, so that it scarcely touches the slide. Warm glycerine jelly is run around the perimeter of the slip, taking care that the fluid does not merge with the central drop. By this method small specimens have little chance of getting lost. As the section rests on its anterior tip it need not be cut at right angles to the axis of the nematode. Further, specimens from small nematodes may be six to seven times longer than they are wide, which makes the specimens easier to manipulate. M.MCK.

(82b) Anderson has studied the morphology of *Pseudofilaria pertenuis* and points out its very close resemblance to *Stephanofilaria* and that it also occurs in skin lesions. He concludes that it is a primitive member of the Stephanofilariinae and does not belong in the Onchocercinae. The classification of the Setariinae is difficult but on morphological grounds members of this subfamily can be aligned with the Stephanofilariidae rather than the Dipetalonematidae. A list of characters common to both *Setaria* and *Stephanofilaria* and of those in which they differ is given. S.W.

(82c) Dollfus has examined numerous specimens of *Opisthioglyphe* collected from *Rana esculenta* from western Europe (particularly the west of France) and from *R. ridibunda* from Morocco. The greater number of these differ appreciably from the type described by Looss and by Lühe, and Dollfus considers that they are referable to *O. endoloba* (Dujardin) and that this is a valid species, not synonymous with *O. ranae*. The most obvious characters in which *O. endoloba* differs most constantly from *O. ranae* are: the general body form, the breadth of the pharynx, the presence of vitellaria in the post-testicular intercaecal space, the shape of the testes which are not transversely elongated and the great length of the median unpaired limb of the excretory vesicle. Both species are illustrated in detail and their distinguishing characters are tabulated. S.W.

(82d) Dollfus identifies as *Macraspis cristata* two whole specimens and a number of fragments collected from the gall-bladder of *Mustelus (Cynias) canis* off the coast at Dakar. He describes the morphology of his specimens but does not agree with Brinkmann that a “dorso-caudal conoidal tip” is a specific character of this species. His original definition of the Aspidogastridae, in which it was stated that these were short forms, is emended as this character applies only to the Aspidogastrinae; the Macraspidinae may attain a length of more than 110 mm. In a note added while the paper was in proof Dollfus records *Scoliodon terraenovae* and *Rhinobatus cemiculus* as new hosts of *Macraspis cristata*. S.W.



(82e) Dollfus & Capron have examined about 292 specimens of a new trematode from the kidneys of a *Necrosyrtes monachus* killed at Hann in Senegal. The new form belongs in the genus *Renicola* but is distinguished from all other species of *Renicola* by the presence of a single testis and from most by the possession of a receptaculum seminis. It is named *R. monorchis* n.sp. and is described and illustrated. S.W.

(82f) Grétilat has examined both living and fixed and sectioned specimens of a paramphistome from the reticulum of zebu cattle in Madagascar and gives a very detailed and well illustrated account of its morphology. He concludes that this form is identical with that originally described as *Amphistomum bothriophoron* by Braun from a zebu at Tananarive, and that Stiles & Goldberger were justified in creating the genus *Bothriophoron*; he does not agree with the many authors who have followed Maplestone in making *Paramphistomum bothriophoron* a synonym of *P. cervi*. The main characters which distinguish *Bothriophoron* from *Paramphistomum* are: the presence of the enormous genital atrium ( $640\mu$  by  $450\mu$ ), the thickness of the genital sphincter ( $130\mu$ ), the existence of a non-muscular pre-oesophageal organ (which is lacking in *Paramphistomum*), and the small size of the miracidium ( $165\mu$  to  $180\mu$  by  $58\mu$  to  $70\mu$ ). S.W.

(82g) Anderson & Chabaud, from a study of the types, redescribe *Thelazia sicki* Strachan, 1957 and refer it, as a new combination, to the genus *Squamofilaria*, which is re-diagnosed. Three further species are included in that genus: *S. coronata* (Rudolphi, 1809); *S. pillersi* (Yorke & Maplestone, 1926) and *S. vestibulata* (Johnston & Mawson) n. comb. (originally *Austrofilaria*). The species *Eucamptus obtusus* (Dujardin, 1845) and *Squamofilaria choprai* Chauhan, 1947 are considered *Filaria* sensu lato. A new genus *Mawsonfilaria* is created for *Austrofilaria rhipidura* Johnston & Mawson, 1952 (type, and only species). The genus *Austrofilaria* Johnston & Mawson, 1940 is considered a synonym of *Squamofilaria*; the genera *Lissonema* Linstow, 1903, *Paramicipsella* Chow, 1939 and *Cerebrofilaria* Kazubski, 1958 are considered synonyms of *Aprocta*, and the genus *Buckleyfilaria* Singh, 1949 a synonym of *Pseudaprocta*. The genera *Spirofilaria* Yamaguti, 1935 and *Pelecitus* Railliet & Henry, 1910 are referred to the Dirofilarinae and the genus *Ularofilaria* Lubimov, 1946 is referred to the Splendidofilarinae. The subfamily Aproctinae Yorke & Maplestone, 1926 (Filaridae Clados, 1885) is re-diagnosed and is considered to contain four genera: *Aprocta* Linstow, 1903; *Pseudaprocta* Schikhobalova, 1930; *Squamofilaria* Schmerling, 1925 and *Mawsonfilaria* n.g. Two keys are given, one to the genera of Aproctinae and one to the species of *Squamofilaria*. It is noted in passing that examination of the type specimens of *Neurofilaria cornellensis* Whitlock, 1952 revealed it to be a metastrongyle. W.G.I.

### 83—Annales de la Société Belge de Médecine Tropicale.

- a. LAMBOTTE-LEGRAND, J. & LAMBOTTE-LEGRAND, C., 1958.—“Notes complémentaires sur la drépanocytose. II. Sicklémie et anémie par ankylostomiasc.” 38 (1), 55–56. [English, German, Spanish & Flemish summaries p. 56.]
- b. DENISOFF, N. & HAENECOUR, F., 1958.—“Nouveau cas de cysticercose généralisée dans l'Est congolais.” 38 (3), 529–530. [English, German, Spanish & Flemish summaries p. 530.]

(83a) As the incidence of sicklaemia among 205 children with severe ancylostomiasis in the Belgian Congo was 23%, and the known incidence of sicklaemia among the child population of Leopoldville is 23% to 24% and in children in hospital, 21.8% to 26.5%, the presence of this blood disease does not seem to afford protection against severe ancylostomiasis in children in the Belgian Congo. M.MCK.

### 84—Annals of the New York Academy of Sciences.

- a. CAMERON, T. W. M., 1958.—“Parasites of animals and human diseases.” 70 (3), 564–573.

(84a) Cameron reviews the evolutionary history of the human parasitic fauna with special reference to the production of disease. Some human parasites, such as pinworms,

were acquired from prehumans; some, such as *Bertiella*, are common parasites of primates in process of being lost by man; some, such as ascarids, were acquired from wild or domestic animals; while others were the consequence of food and other habits. Man is still in process of acquiring further parasites from both wild and domestic animals. Adult helminths usually cause disease only when present in considerable numbers. Cameron stresses that although preventive vaccines and sera are not yet available for any human parasitic infections and specific chemotherapy remains to be discovered for many, nevertheless the specificity of the life-cycle of these parasites renders practical preventive measures feasible, often by such simple expedients as good hygiene or adequate cooking of food. J.M.W.

### 85—Annals of Tropical Medicine and Parasitology.

- a. DUKE, B. O. L., 1958.—“The intake of the microfilariae of *Acanthocheilonema streptocerca* by *Culicoides milnei*, with some observations on the potentialities of the fly as a vector.” 52 (2), 123–128.
- b. SANDARS, D. F., 1958.—“A pancreatic fluke, *Zonorchis australiensis* sp.nov. (Trematoda), from Australian marsupials.” 52 (2), 129–138.
- c. CHODNIK, K. S., 1958.—“Histopathology of the aortic lesions in cattle infected with *Onchocerca armillata* (Filaridae).” 52 (2), 145–148.
- d. CROSSKEY, R. W., 1958.—“The body weight in unfed *Simulium damnosum* Theobald, and its relation to the time of biting, the fat-body and age.” 52 (2), 149–157.
- e. DUKE, B. O. L. & WIJERS, D. J. B., 1958.—“Studies on loiasis in monkeys. I. The relationship between human and simian *Loa* in the rain-forest zone of the British Cameroons.” 52 (2), 158–175.
- f. BOGLIOLO, L., 1958.—“Splenoportography in hepato-splenic schistosomiasis mansoni.” 52 (2), 181–185.
- g. WHARTON, R. H., EDESON, J. F. B., WILSON, T. & REID, J. A., 1958.—“Studies on filariasis in Malaya: pilot experiments in the control of filariasis due to *Wuchereria malayi* in East Pahang.” 52 (2), 191–205.
- h. LEWIS, D. J., 1958.—“Observations on *Simulium damnosum* Theobald at Lokoja in Northern Nigeria.” 52 (2), 216–231.
- i. FITZSIMMONS, W. M., 1958.—“*Saurositus macfie* sp.nov., a filarioid parasite of the lizard *Agama mossambica mossambica* Peters.” 52 (3), 257–260.
- j. DUKE, B. O. L. & BEESLEY, W. N., 1958.—“The vertical distribution of *Simulium damnosum* bites on the human body.” 52 (3), 274–281.
- k. WEBBE, G. & MSANGI, A. S., 1958.—“Observations on three species of *Bulinus* on the east coast of Africa.” 52 (3), 302–314.
- l. SMITHERS, S. R., 1958.—“Attempted control of *Bulinus senegalensis* Müller, a vector of *Schistosoma haematobium* in the Gambia.” 52 (3), 315–319.
- m. LAVOIEPIERRE, M. M. J., 1958.—“Studies on the host-parasite relationships of filarial nematodes and their arthropod hosts. II. The arthropod as a host to the nematode: a brief appraisal of our present knowledge, based on a study of the more important literature from 1878 to 1957.” 52 (3), 326–345.
- n. HYNES, H. B. N. & NICHOLAS, W. L., 1958.—“The resistance of *Gammarus* spp. to infection by *Polymorphus minutus* (Goeze, 1782) (Acanthocephala).” 52 (3), 376–383.

(85a) *Culicoides milnei* is probably an effective natural vector of *Acanthocheilonema perstans*, but little is known of its ability to take in microfilariae of *A. streptocerca*. Dissection of wild *C. milnei* showed only one out of 1,266 naturally infected. When fed on a volunteer with a heavy skin infection of *A. streptocerca* in the scapular region (*streptocerca* area), and the calves (*streptocerca*-free area), the results showed that *C. milnei* takes in very few *A. streptocerca* and (comparatively) less than one-tenth the number taken in by *C. grahamii*. W.K.D.

(85b) Sandars reports a new species of trematode, *Zonorchis australiensis*, found in the pancreatic ducts of bandicoots (*Thylacis obesulus*, formerly *Isoodon obesulus*), with a detailed description. It is considered to be new because of the geographical position, and the site in the host. The suburbs of Brisbane appear to be hyperendemic areas. The classification of some genera of the Dicrocoeliinae is discussed. W.K.D.

(85c) In cattle in Ghana there is a high incidence of aortic infections with *Onchocerca armillata*. The article gives the detailed pathology and histology of the lesions. Most of the nodules are small and do not reach the size of “tumours” associated with other species of



*Onchocerca*. Numerous tunnels burrowed into the aortic wall were found along with aggregates of microfilariae. This suggests that the female worms wander extensively in the aortic wall. The occasional termination of the tunnels in the aortic lumen indicates possibly some so far undetermined phase in the parasite's life-history.

W.K.D.

(85d) Crosskey has studied the value of the development of the fat-body in *Simulium damnosum* as an indication of the age of the flies and of whether they are parous or no. Flies with abundant fat-body had not normally taken a blood-meal and were nulliparous; flies without fat-body were most numerous in the middle of the day. In the area concerned the highest infection rate with *Onchocerca volvulus* is probably in flies biting between 10 a.m. and 2 p.m. Young flies bite mainly in the morning and evening. In some cases the environment appeared to affect the weight of the fat-body.

W.K.D.

(85e) Duke & Wijers report the results of investigations into the relationship and differences between human and simian *Loa*. The simian form has a nocturnal and the human a diurnal periodicity. Wild *Chrysops* spp. were used for transmission experiments. Natural infections were found in 51 of 53 *Mandrillus leucophaeus*, 21 of 86 *Cercopithecus nictitans martini* and 8 of 68 *C. mona mona*. Attempts to transmit simian *Loa* to man were unsuccessful. Human strains were transmitted to monkeys by cyclical passage through *Chrysops silacea*; the microfilariae maintained their diurnal periodicity but were not so large in the monkeys as in man, suggesting that the former is an imperfect alternative host. No evidence was found to show whether simian *Loa* can develop in man. Under natural conditions transmission of the human strain to monkeys can be ignored.

W.K.D.

(85f) Bogliolo reports on splenoportographic studies of the Symmers type of hepatosplenic schistosomiasis in Brazil, which were made to determine if the changes in the intra-hepatic portal tree can be detected in living subjects. Three patients were examined by splenoportography after injection of contrast medium; X-rays showed a picture similar to that found in the cadaver and different from those in the controls.

W.K.D.

(85g) Wharton & his co-workers report studies of *Wuchereria malayi* and its vectors in East Pahang, where recent studies showed an over-all infection rate of 40%, males having a higher microfilarial rate and more elephantiasis. *Mansonioides longipalpis* is the principal vector. *W. pahangi* is found in animals also and in the mosquito the larvae of the two species cannot be distinguished. A survey was made in three villages before and after treatment, with diethylcarbamazine in two and by residual spraying with dieldrin in one. Eight weekly doses of banocide, the first of 0.5 mg. per kg. body-weight, the second of 1.0 mg. per kg. and the last six of 5.0 mg. per kg. gave better results than monthly doses for six months. Although spraying had apparently little effect on the mosquitoes outside it was effective in the houses, and the reduction in infectivity of the human population caused a reduction in the number of mosquitoes showing microfilariae and in the average microfilarial load, but not in the transmission index. Dieldrin spray had a special effect on *Culex pipiens fatigans* resting in houses. There appears to be an untreated reservoir of *W. malayi* in wild and domestic animals.

W.K.D.

(85h) Lewis describes a detailed study of *Simulium damnosum*, in the Lokoja area of Northern Nigeria, in which the wing width was measured in 723 flies and particular attention was paid to the recognition of parous and nulliparous flies, by means of the corpora lutea and other structures in the ovarioles and, while alive, by the clarity or opacity of the halteres; parous flies were examined for *Onchocerca* and 10% were found to be infected, this probably representing an infection rate of 2% or less of the whole population. Nulliparous flies lay more eggs than parous flies. In starvation experiments all those flies which survived for more than 37 hours were nulliparous.

W.K.D.

(85i) Fitzsimmons describes three female and two male worms of *Saurositus macfieii* n.sp. from the body-cavity of an *Agama* from Nyasaland. Sheathed microfilariae were found in the

blood. *S. macfiei* differs from *S. agamae* in the following characters: males and females of *S. macfiei* are shorter and thicker; males have three more pairs of post-anal papillae; the vulva is nearer the posterior end; and the microfilariae are smaller. W.A.F.W.

(85j) Duke & Beesley, working in West Africa, investigated the vertical distribution of bites of *Simulium damnosum* on the bodies of bait-boys standing in different positions. They found that the flies attacked predominantly those parts of the body which appear immediately above the substrate over which they are flying immediately prior to settling on the victim. Thus in the normal case of a man standing on open ground 98% of bites will be below the waist; but in the case of a man standing in water or thick vegetation growing up to waist level, the proportion of bites received above the waist will be increased with correspondingly increased risk of early involvement of the eyes. Fishing, hunting and ferrying are therefore dangerous occupations. J.M.W.

(85k) Webbe & Msangi have carried out prolonged observations on a number of water bodies in the Tanga District, Tanganyika. Three species of *Bulinus*, all belonging to the subgenus *Physopsis* were found in these habitats and observations on their biology are recorded. These observations include age composition of snail populations throughout the year, incidence of trematode infections, ability to withstand desiccation and probable survival of trematode infection during aestivation in one of the species, *B.(P.) nasutus*. These observations are of the greatest importance in the planning of snail control programmes. C.W.

(85l) Smithers reports the results of a series of field experiments in the use of sodium pentachlorophenate as a molluscicide against *Bulinus senegalensis* in laterite pools in the Gambia. The compound was applied both by spraying the pools with an aqueous solution, and by dumping the powder in small sacks. Final dilutions of 10, 5 and 2 p.p.m. were used and in all pools a great reduction in the snail population was achieved but in every case the snails reappeared by the tenth week after treatment. In some cases the density in the treated pools was as great as that in the control pools by the fifteenth week after application. Despite this Smithers points out that the snail population was drastically reduced at the critical time for transmission of *Schistosoma haematobium* and it is possible that some control of the infection may be achieved in this way. C.W.

(85m) Continuing his review of the relationships of filariae with their arthropod hosts [for abstract of part I of this review see Helm. Abs., 27, No. 9h], Lavoipierre gives a table showing the hosts and sites of development of filariae which have so far been studied. The arthropod hosts include mosquitoes, buffalo flies, biting midges, stable flies, fleas and a psychodid. Development has been described as taking place in the muscles, fat-body, Malpighian tubules and haemocoel, but in view of recent work showing that the development of several species of filaria is intracellular, development in the haemocoel must be considered *sub judice*. The uptake of microfilariae by their arthropod hosts and the route of escape of the infective larvae from them are discussed. The effects of the parasite on its host are degenerative changes in the cells of the Malpighian tubules and muscle cells, interference with the formation of the peritrophic membrane and a raising of the death rate over that of uninfected arthropods. The parasite may be subject to a crowding effect or encapsulation. Lavoipierre points out that an arthropod which is a good host under laboratory conditions may not be an efficient vector in nature. W.A.F.W.

(85n) Hynes & Nicholas, using the three native species of *Gammarus*, *G. pulex*, *G. lacustris* and *G. deubeni* attempted cross-infection with the corresponding strains of *Polymorphus minutus*. They found that when embryonated eggs of the parasite are fed to the same species of *Gammarus* as that from which they originated, development proceeds normally; but that when eggs are fed to a *Gammarus* of a different species from that in which the parent worm originated, many of the parasites fail to develop and become blackened with a pigment that was shown to be melanin. The significance of this resistance to infection is discussed. J.M.W.



**86—Archives de l'Institut Pasteur d'Algérie.**

- a. DOLLFUS, R. P., 1958.—“Deux nouvelles variétés d'*Oochoristica* chez des sauriens d'Afrique du Nord (Cestoda, Linstowiidae).” **36** (1), 32–40.
- b. BALOZET, L., 1958.—“La couleuvre fer à cheval, hôte intermédiaire de trois ténias du chat.” **36** (1), 41–54.

(86a) Dollfus describes and figures two new varieties of *Oochoristica* from North African lizards, namely, *O. darensis* var. *elassolecithogenes* n.var. from the intestine of *Uromastix acanthinurus*, which differs from *O. darensis* in having less well developed atrial musculature, a fusiform seminal receptacle and a reduced vitelline gland; and *O. tuberculata* var. *pseudogamae* n.var. from the intestine of *Acanthodactylus erythrurus* var. *lineomaculatus*, which differs from *O. tuberculata* in having a smaller scolex and in possessing a feeble atrial musculature. J.M.W.

(86b) Balozet found encysted cysticerci of *Diplopylidium* and *Tetrathyridium* in the North African grass-snake *Zamenis hippocrepis*. When these forms were fed to a young cat the adult cestodes *Diplopylidium acanthotetra*, *D. nölleri* (first North African record) and *Mesocestoides lineatus* forma *minor* were recovered. Previous attempts to complete the life-cycle of *Tetrathyridium* larvae experimentally are reviewed and discussed. Differences in the speed of development and in the size of the adult cestodes are characteristics which permit the differentiation of species not separated by anatomical characters. J.M.W.

**87—Archives de l'Institut Pasteur du Maroc.**

- a. DOLLFUS, R. P., 1958.—“Miscellanea helminthologica maroccana XXV. Sur quelques fragments de deux espèces de Dilepididae (Cestodes) à appareil occlusif chitinoïde, parasites de l'intestin d'*Apus pallidus brehmorum* Hartert.” **5** (8), 504–539.
- b. DOLLFUS, R. P., 1958.—“Miscellanea helminthologica maroccana XXVI. Nouvelles récoltes de *Tetrathyridium* au Maroc (Cestodes, Mesocestoididae).” **5** (8), 540–546.
- c. DOLLFUS, R. P., 1958.—“Miscellanea helminthologica maroccana XXVII. Changement d'appellation pour *Prosthodendrium pyramidum* forma maroccana R.Ph. Dollfus 1954.” **5** (8), 547–550.
- d. DOLLFUS, R. P., 1958.—“Miscellanea helminthologica maroccana XXVIII. Sur deux espèces de Gorgoderidae (Trematoda Digenea) de la vessie de *Rana ridibunda* Pallas, au Maroc.” **5** (8), 551–562.
- e. DOLLFUS, R. P., 1958.—“Miscellanea helminthologica maroccana XXIX. Deux espèces de distomes (gen. *Pleurogenoides* et *Opisthioglyphe*) de l'intestin de *Bufo* du Moyen-Atlas.” **5** (8), 563–576.
- f. DOLLFUS, R. P., 1958.—“Miscellanea helminthologica maroccana XXX. Présence au Maroc de *Platynosomum semifuscum* A. Looss 1907 (Trematoda, Digenea).” **5** (8), 577–581.

(87a) Dollfus describes *Anomotaenia brachycolpos* n.sp. from fragments, with scolex, of two immature individuals collected from *Apus pallidus brehmorum*. The shortness of the vagina between the chitinous occlusive apparatus and the genital sinus is characteristic. *Anomotaenia depressoides* n.sp., from the same host, described from several fragments of strobilus without scolex, resembles *A. depressa* but has irregularly lobed ovaries, irregular testes which do not extend in front of the ovaries, and strong spines on the posterior borders of the proglottides. The species of *Anomotaenia*, *Pseudangularia*, *Neoangularia* and *Neoliga* are reviewed to show which of them has a chitinous occlusive apparatus between the receptaculum seminis and the vagina. W.A.F.W.

(87b) Dollfus records *Tetrathyridium lacertae-viridis* from *Zamenis hippocrepis* and *Coelopeltis monspessulana*, and gives a description of similar worms which were taken from the body-cavity of *Chalcides ocellatus* var. *polylepis*. He also describes 24 specimens of *Tetrathyridium*, from the intestine of *Aethechinus algirus*, which may be the same as those found by Joyeux (1923) in the same host. W.A.F.W.

(87c) Dollfus has examined about 60 more specimens of a *Prosthodendrium*, which he previously described as *P. pyramidum* forma *maroccana*. He now agrees with Dubois 1955 [for abstract see Helm. Abs., **24**, No. 923a] that the material is not *P. pyramidum*. He renames

it *P. maroccanum* nom. nov. since it differs from *P. parvouterus*, to which Dubois assigned it, in the following characters: oesophagus longer than pharynx (in *P. parvouterus* the oesophagus is absent); gut caeca never extend laterally completely in front of the testes; ovary never at the same level as the testes, never in the space separating one testis from the prostrate, and never reaching as far as the caeca. W.A.F.W.

(87d) Dollfus describes two species of *Gorgoderina* from the bladder of *Rana ridibunda*. Two specimens are assigned to *G. vitelliloba* (Olsson, 1876) and a second group of specimens to *G. microovata* Fuhrmann, 1925. The latter differ in the shape of the ovary from those which he previously recorded [for abstract see Helm. Abs., 20, No. 176c]. The genera *Gorgoderina* and *Phyllodistomum* and their subgenera are discussed and it is suggested that they should be differentiated on the grounds of the class of the host (Batrachia and Pisces) and on the shape of the body. W.A.F.W.

(87e) Thirty-three specimens of *Pleurogenoides ifranensis* n.sp. were found in the intestine of a *Bufo bufo spinosus* which was collected at Ifrane. *P. ifranensis* resembles *P. stromi* Travassos, 1930, but differs from it in the position of the genital pore. *P. ifranensis* shows the following characters which are not found together in any other species of the genus: ovary in the mid-line, between the two gut caeca; testes more or less asymmetrically placed in front of the middle of the ventral sucker; genital pore at one-third of the length of the body from the anterior end; oesophagus absent; cirrus pouch entirely or almost entirely behind the intestine, not traversed or not completely traversed by the left caecum. On examining his specimens of *Opisthioglyphe*, Dollfus finds that it is not possible to group the species of the subgenera according to the position of the cirrus pouch in relation to the ventral sucker, or to the form and position of the testes [compare Dollfus, 1957, for abstract see Helm. Abs., 26, No. 6c]. He also concludes that *O. endoloba* (F. Dujardin, 1845) is not a synonym of *O. ranae* (Froelich, 1791), but that Travassos' specimens from *Rana ridibunda* and his own new material are *O. endoloba*. W.A.F.W.

(87f) Dollfus records *Platynosomum semifuscum* in a *Circaetus gallicus* from Morocco and notes minor differences between his eight specimens and those described by Looss. This is the first record of the species from North Africa. W.A.F.W.

# 88—Atti della Accademia Nazionale dei Lincei. Rendiconti. Classe di Scienze Fisiche, Matematiche e Naturali. Rome.

- a. BIOCCA, E. & FERRETTI, G., 1958.—“Un nuovo trematode; *Dollfusinus frontalis* gen.nov. et sp.nov., parassita dei seni naso frontali di *Erinaceus europaeus*.” Serie 8, 24 (2), 171-175.
- b. CHABAUD, A. G., 1958.—“Osservazioni sulla classificazione del sottordine *Strongylina* e creazione di una nuova sotto-famiglia: *Archeostrongylinae*.” Serie 8, 24 (2), 176-179.

(88a) Biocca & Ferretti describe and illustrate *Dollfusinus frontalis* n.g., n.sp. from *Erinaceus europaeus* in Italy. This new trematode is very closely related to *Leucochloridium* but may be distinguished from it by its habitat in the frontal sinuses and nasal cavity and by the arrangement of the vitellaria which do not extend forward beyond the level of the anterior margin of the ventral sucker. S.W.

(88b) Chabaud reviews the classifications of the suborder Strongylina proposed by Schultz (1951) and by Dougherty (1951) and concludes that that of Dougherty is the more natural. A new subfamily Archeostrongylinae, of the family Syngamidae, is proposed for the genus *Archeostrongylus* Biocca & Ferretti, 1957 [description published in 1958: for abstract see Helm. Abs., 27, No. 10a]. The new subfamily is characterized by a hexagonal mouth opening directed anteriorly, and surrounded by eight papillae, leading into a hexagonal buccal cavity. The caudal bursa of the male is small with reduced rays; the female tail is without a terminal spike. The females are viviparous and the embryos are relatively very large. W.G.I.



**89—Australian Journal of Agricultural Research.**

- a. RIEK, R. F., TURNER, H. N., McKEVETT, M. & ROBERTS, F. H. S., 1958.—“Adjustments for faecal worm egg counts from cattle based on faecal consistency and on age and body weight of host.” **9** (3), 391–402.

(89a) Variations in the moisture content of cattle faeces were found to contribute little to the total variation in egg counts. Adjustments of egg counts to this factor are therefore of little value. The increased output of faeces with increasing age and weight were, however, important factors to consider. The authors tabulate the faecal output which can be predicted in cattle of different body-weights and ages kept indoors and give the ratios needed to adjust the numbers of eggs per gramme to a standard age and body-weight. Prediction of faecal output from age varied only slightly from prediction based on body-weight: age can therefore be used alone as a basis for correction.

M.MCK.

**90—Australian Veterinary Journal.**

- a. SPRENT, J. F. A. & ENGLISH, P. B., 1958.—“The large roundworms of dogs and cats—a public health problem.” **34** (6), 161–171.
- b. PULLAR, E. M. & MARSHALL, W. K., 1958.—“The incidence of hydatids in Victorian cattle.” **34** (7), 193–201.
- c. GEMMELL, M. A., 1958.—“Arecoline hydrobromide as a taeniafuge in dogs, with special reference to its use in controlling hydatid disease.” **34** (7), 207–212.
- d. GEMMELL, M. A., 1958.—“The efficiency of dichlorophen (2,2'-dihydroxy-5,5-dichlorodiphenyl methane) against *Echinococcus granulosus* infestations in dogs.” **34** (8), 249–252.

(90a) Sprent & English, quoting other authors and experimental work by Sprent, summarize and discuss in connection with visceral larva migrans in children the incidence, life-history, pathogenicity and diagnosis of *Toxocara canis*, *T. cati* and *Toxascaris leonina*, the treatment of dogs and cats, and the prevention of human infection. The greatest danger in acquiring visceral larva migrans lies in the close association of children with puppies; cats appear less harmful as they become infected later in life and are more aloof in behaviour. G.I.P.

(90b) Pullar & Marshall report that 2,074 of 17,316 cattle killed in Victoria were infected with hydatids and calculate that this means an incidence of 7% on the annual kill for the State. The rate of infection increased with age from 0.2% in those under one year old to 15.2% in those over four years old and females were more heavily infected than bulls and steers (17.7% compared with 8.3% and 4.7% respectively). The infection rates of various organs were: liver 88.4%, lungs 72.7%, spleen 7.2%, other organs, odd cases only. Multilocular hydatids occurred in the liver (13.8%), in the lungs (6.1%) and in the spleen (2.2%), and these were not significantly less fertile than the cystic forms. Fertility declined with age and the proportion of degenerate cysts in older cattle was significantly high. S.W.

(90c) Arecoline hydrobromide was given in doses ranging from 1/16 to 1/4 grain per 10 lb. body-weight to 875 dogs on country properties or abattoirs. Of these, 197 (22.5%) did not purge after the dose. This failure rate was not influenced by the size of the dose. Of 39 dogs treated again one month later, six were found to be infected with *Echinococcus granulosus* compared with nine on the previous occasion. Although the absolute clearance rate was low, the worm burden was reduced by more than 90%. In five dogs experimentally infected with *E. granulosus*, and later dosed with arecoline hydrobromide, 95% reduction in infection was obtained in three dogs, whilst the other two, which did not purge after the dose, remained heavily infected. The evidence suggests that where there is failure to purge, the efficiency of the drug may be low. Reinfection with other cestodes had occurred within one month of initial treatment—this indicated that treatment every four weeks would be necessary to produce a significant fall in cestode infection. It is suggested that although arecoline hydrobromide is highly efficient as a taeniafuge in dogs which purge after the dose and although the toxic effects are minimal, the need for frequent dosage precludes its use as the sole method of eradication in areas where high incidence of hydatid infection occurs. O.D.S.



(90d) Of twelve dogs experimentally infected with *Echinococcus granulosus*, six were given dichlorophen at 1.0 gm. per 10–12 lb. body-weight whilst the other six were given two doses on successive days, the dose ranging from 1.0 gm. to 4.0 gm. per 10–12 lb. on each occasion. The animals were killed and autopsied five days after the end of treatment and the worm burdens compared with those of five control dogs given arecoline hydrobromide. In the controls, the worm burden was estimated from the number of worms recovered at autopsy together with those passed on purging. Dichlorophen showed no efficiency against *E. granulosus* at the recommended dose of 1.0 gm. per 10–12 lb. and doubtful efficiency at doses up to four times this level. Of the twelve dogs treated with dichlorophen, ten still had *Dipylidium caninum* at autopsy. It is concluded that even if the drug was given at frequent intervals it would not influence infections with *E. granulosus* but may influence the degree of infection with *D. caninum*. O.D.S.

### 91—Avian Diseases. Ithaca.

- a. REID, W. M., PATE, D. D. & KLECKNER, A. L., 1958.—“Effects of *Ascaridia galli* on chicks with infectious bronchitis.” **2** (1), 99–109.

(91a) A greater depression of food consumption and weight gain was shown in three-week-old chicks infected with both *Ascaridia galli* and infectious bronchitis than in chicks with a single infection of either of these diseases. The combined infection caused an average mortality of 3.1% whereas no deaths occurred in chicks where either infection occurred singly. K.H.

### 92—Berliner und Münchener Tierärztliche Wochenschrift.

- a. SCHMIDTKE, D. & SCHMIDTKE, H. O., 1958.—“Klinische Anwendung von Piperazin als Anthelminthikum beim Hund und bei der Katze.” **71** (16), 305–308. [English summary p. 308.]  
 b. HÖRNING, B., 1958.—“Parasitenbekämpfung auf dem Bauernhof.” **71** (18), 364–367.  
 c. KOLB, E., 1958.—“Eigenschaften und Anwendungsmöglichkeiten einiger Fermente (Pepsin, Trypsin, Chymotrypsin, Papain, Streptokinase, Streptodornase, Hyaluronidase) in der tierärztlichen Praxis.” **71** (19), 371–374. [English summary p. 374.]  
 d. SCHMIDT-HOENS DORF, F. & SCHOTT, G., 1958.—“Piperazinphosphat als Spulwurmmittel bei Zebras.” **71** (20), 403–404.

(92a) Schmidtke & Schmidtke have tested piperazine citrate against ascarid infections in dogs and cats. The drug was a proprietary preparation in paste form containing methyl cellulose and glycerin and each 20 gm. tube of paste contained 7.8 gm. piperazine. The dosage of piperazine was equivalent to 283 mg. citrate per kg. body-weight for dogs and 141 mg. per kg. for cats: it was administered with food, was readily taken, and side effects were rare and insignificant. A total of 143 individual dogs, 33 complete litters of dogs, and 49 cats were given this treatment and ascarids were recovered from 112, 30 and 37 respectively. Of 40 dogs, 12 litters of dogs and 10 cats subjected later to faecal examination, ova were recovered only from two, one, and one respectively. The authors conclude that piperazine paste is the remedy of choice against ascarids. A.E.F.

(92b) Hörning points out that industrialization in Germany is reducing the amount of land available for the feeding of domestic animals and that the consequent increased density of the animal population increases the risk of parasitic diseases. While anthelmintics can be of great value in treating infected animals the most important measure is prophylaxis. Hörning summarizes the basic principles of stall and field hygiene and shows how a knowledge of the bionomics and life-histories of the parasites can be used to break the chain of infection. A.E.F.

(92c) Kolb reviews the properties and veterinary uses of certain ferments, among them the useful anthelmintic papain. Papain is particularly active against intestinal nematodes since it dissolves their cuticle and so permits the digestive juices of the host to destroy them. The commercial preparations nematolyt and vermizym have a papain basis and are said to be effective



against ascarids in both man and domestic animals. Vermizym is valuable in ridding fur-bearers and poultry of intestinal worms, and *in vitro* is also effective against lungworms and stomach worms of sheep and horse strongyles. J.M.W.

(92d) Schmidt-Hoensdorf & Schott have found piperazine very effective against ascarid infection in zebras at the Berlin Zoo. Two animals were given Tasnon [a piperazine citrate preparation] and nine received piperazine phosphate at the rate of 10 gm. per 50 kg. body-weight. In every case the treatment was completely successful and there were no side effects. A horse, a foal and a pony were also successfully treated by the same method. A.E.F.

### 93—Boletín Chileno de Parasitología.

- a. FAIGUENBAUM, J., 1958.—“Distomatosis hepática humana con especial referencia a complicaciones quirúrgicas.” **13** (2), 29–31. [English summary p. 29.]
- b. DOREN, G., GALDAMES, M. & SILVA, R., 1958.—“Algunas consideraciones sobre el rendimiento de las técnicas de diagnóstico de enteroparasitosis.” **13** (3), 42–44. [English summary p. 42.]
- c. DONCKASTER, R. & HABIBE, O., 1958.—“Contribución al estudio de la *Hymenolepis nana*. II. Ensayo terapéutico con acranil, hexylresorcinol, papaina, piperacina y puromicina.” **13** (3), 44–49. [English summary p. 44.]
- d. FERNÁNDEZ, E. & RODRÍGUEZ, H., 1958.—“Incidencia de triquinosis en el Matadero Municipal de Santiago durante los años 1936 a 1957.” **13** (3), 53–54. [English summary p. 53.]
- e. HEVIA, H., SCHENONE, H., KLEIN, O. & ALARCÓN, R., 1958.—“Distomatosis cutánea asociada a erupción reptante.” **13** (3), 57–59. [English summary p. 57.]

(93a) Faiguenbaum reviews the surgical complications occurring in cases of human infection with *Fasciola hepatica*. The most frequent are calcification of the gall-bladder and obstructive jaundice due to the presence of adult parasites in the common bile-duct lumen. Since anthelmintic treatment may render surgical intervention unnecessary, early parasitological diagnosis is desirable in all suspected cases. J.M.W.

(93b) For comparative purposes 5,356 specimens of faeces were examined at the Department of Parasitology, University of Chile by a modified Telemann's method for intestinal parasites [and commensals] in two concentrated specimens, one concentrated specimen, and by direct examination. The results were compared. The helminths *Ascaris*, *Hymenolepis* and *Taenia* spp. gave the highest percentages by direct examination but even then very much lower than by concentration. The authors consider that there is a certain degree of variability in the distribution of parasites in the faeces which can give false results if only one concentrated specimen is examined. The authors recommend that in every instance two specimens of faeces concentrated by the modified Telemann's method should be examined if there is a suspicion of any intestinal parasite. W.K.D.

(93c) The authors first point out that the internal cycle of the biology of *Hymenolepis nana* must be taken into account in treatment, which, in the case of drugs acting on the adult worms and not on the cercocysts, must be repeated. They then report the results of treatment by five different drugs of 112 patients of both sexes whose ages ranged from 0 to more than 36 years. The great majority were in the one to ten-year age group. The drugs used were: (i) acranil (a methoxyacridilic compound); (ii) papain as Velardon and Nematocida-Om; (iii) puromycin; (iv) hexylresorcinol as Crystoids and (v) piperazine as Antepar. Various schemes of dosage were tried, every treatment was repeated at least once, and if one drug failed another was tried. The faeces were examined by a modified Telemann's method ten days after the end of treatment, then 30, and 90 days after and the results reported at the end of each period. After 90 days two out of 46 treated with acranil, one out of 25 treated with papain, negative; two out of 52 treated with puromycin, none out of 26 treated with hexylresorcinol and one out of 34 treated with Antepar were negative. As for side effects, ten out of 43 treated by acranil developed a yellow colour of the skin which was greatly objected to; the taste and smell of Velardon was strongly resented, and a number of symptoms developed in those treated



with puromycin. The authors conclude that although results were better with acranil and puromycin, they were generally so poor that there does not seem to be any satisfactory treatment yet. W.K.D.

(93d) This is a report of the results of investigation for *Trichinella* infection of pigs killed at the municipal slaughterhouse at Santiago from 1936 to 1955. Until 1952 the diagnosis was made by examination of one portion cut from the muscular pillars of the diaphragm; but from then onwards three similar specimens were examined using a trichinoscope with a  $\times 90$  magnification. However in spite of the improvement in the method of examination the figures for pigs found infected have remained round about 2.7 per thousand. The authors consider that the real level of infection is very much higher. W.K.D.

(93e) This is an interesting clinical record of two separate but peculiarly associated conditions, a creeping eruption due to a larval ancylostome, and a subcutaneous nodule caused by a trematode. A 50-year-old man had a nodule in his supra-umbilical region, but as the result of hospital treatment did not satisfy him he treated the lump by mud plasters, after which he developed a creeping eruption. Biopsy of this was negative but samples of mud taken from the site of origin of the plasters showed an ancylostome larva which was considered to be probably *Ancylostoma caninum*. Subsequently the original nodule was excised and sections showed a young adult *Fasciola hepatica*. Three series of nine successive samples of faeces examined four months later were all negative for *F. hepatica* ova. The infection was probably contracted through eating raw infected vegetables. W.K.D.

#### 94—British Medical Journal.

- a. ANON., 1958.—“Protective ointment against Bilharzia.” [Annotation.] Year 1958, 2 (5089), 151–152.
- b. BENSTED, H. J. & ATKINSON, J. D., 1958.—“Hydatid complement-fixation test: influence of intermediate host protein on specificity of sheep hydatid fluid antigen.” Year 1958, 2 (5090), 203–205.

(94a) The advantages and disadvantages of protective ointments against bilharzia are discussed, with particular reference to Rhodesia, in relation to the different types of personnel likely to be exposed to infection—farmers, miners, anglers, engineers. Half an ounce (14 gm.) of the ointment recommended by Alves (castor oil 40 parts, lanolin 15 parts, diglycol stearate 10 parts, dibutyl phthalate 25 parts and paraffin wax 10 parts) is said to be sufficient to cover the forearms, hands, ankles and feet. The efficacy of this method of protection in practice will depend on the consistency with which the ointment is used; and remains to be assessed. J.M.W.

(94b) The routine hydatid complement fixation test is generally considered to be specific. However, investigation of some of the rare false positives that do occur suggested that the use of antigen containing host (sheep) protein, in addition to the specific hydatid fractions, is responsible for confusing the issue in patients previously immunized with vaccines, such as anti-rabies vaccine, containing the same or related host protein. This was confirmed by experiments on rabbits, guinea-pigs and human volunteers. J.M.W.

#### 95—British Veterinary Journal.

- a. FRY, N. C., 1958.—“Diseases of sheep in Ghana (Gold Coast).” 114 (6), 209–215.
- b. THORNTON, H., 1958.—“Problems of slaughter and meat inspection and the need for their investigation by the research worker. Part II.” 114 (6), 220–234.
- c. BROWN, T. H. & SPEDDING, C. R. W., 1958.—“A study of husk in calves.” 114 (8), 296–307.
- d. CHANDRASEKHARON, K. P., SASTRY, G. A. & MENON, M. N., 1958.—“Canine spirocercosis with special reference to the incidence and lesions.” 114 (10), 388–395.

(95a) Endoparasitic infection is stated to be one of the ten principal diseases affecting sheep in the coastal plain of Ghana. Parasitic gastro-enteritis due principally to *Haemonchus contortus* is the chief cause of mortality especially among lambs. Many deaths were due to

*Moniezia expansa*, a considerable number resulting from impaction, but control was attained by four-weekly dosing with lead arsenate.

R.T.L.

(95b) In a section of this article the significance of small haemorrhages in the kidneys of slaughtered pigs is discussed. Some authorities attribute their presence in normal pigs to an irritant of dietetic origin but Thornton suggests that they may be due either to the action of fourth-stage larvae of *Ascaris lumbricoides* or to capillary rupture caused by electrical slaughter.

R.T.L.

(95c) The authors have made a study, under grazing conditions, of the live-weight gain of calves infected with husk. The work has been divided into two periods. During the first, in which the animals exhibited the symptoms of the disease, a significant reduction in the live-weight gain was measured. Examination of the individual weight records shows that in some animals the depression occurs early in the disease and in others at a later stage. In the second period the live-weight gains of the surviving calves were measured during recovery and it was found that calves, which had shown an early depression of weight gains, suffered the least retardation over the whole experimental period. Comparison was made throughout the experiment with control animals of equivalent age and which were maintained under similar conditions.

K.H.

(95d) 910 dogs of all breeds and ages up to seven years showed a 23.5% incidence of *Spirocerca lupi* infection at autopsy. The majority of infections were in dogs over one year old. Not a single case had been detected at previous faecal examinations, possibly owing either to intermittent oviposition or lack of maturity in female worms. Alsations had an infection rate (38.6%) above the average, perhaps due to some peculiar habit of this breed. The lesions are described and figured and their location tabulated.

J.M.W.

#### 96—Bulletin of Endemic Diseases. Baghdad.

- a. EL AZZAWI, J. A. H. & KLIMT, C. R., 1958.—“Bilharzia skin test trials in Iraq.” 2 (3/4), 100–116.
- b. NOR EL-DIN, G., 1958.—“Report on ankylostomiasis survey in Iraq, 1954.” 2 (3/4), 117–137.
- c. BAILEY, V. M., 1958.—“An intestinal parasite survey in a rural district of Baghdad.” 2 (3/4), 148–151.

(96a) El Azzawi & Klimt carried out skin tests on 315 cases of *Schistosoma haematobium* and 500 bilharzia-free individuals, using Salisbury (*S. mansoni* cercarial) antigen. Only 70.8% of the infected group showed a true positive reaction, while no less than 56.0% of the control group showed a false positive reaction. A second (London) antigen prepared from livers of *Australorbis glabratus* infected with *S. mansoni* was used to carry out skin tests on 500 bilharzia-free persons. 13.4% gave negative reactions, 12.8% positive reactions, and 73.8% gave unclassifiable reactions. A significant correlation was established between positive skin reaction and presence of helminth ova in the faeces.

J.M.W.

(96b) Nor El-Din reports on the results of an ancylostomiasis survey in Iraq. The incidence of the disease varies widely from locality to locality according to local conditions, but is generally high in the centre and south of the country, low or absent in the north. The reasons for this state of affairs are discussed. High incidence was particularly observed in association with palm-trees and among sarifa (reed or mud hut) dwellers. Owing to the difficulty of getting faecal samples from certain sections of the population the figures obtained are not considered to give a complete picture of the situation. Nor El-Din recommends improving the training of physicians, health officials and medical students in relation to hook-worm infection; health education; establishment of proper latrines in houses, schools and villages; a campaign against bare-footedness; and establishment of a proper system of filtered water. He outlines a scheme for elimination of ancylostomiasis in five years, based on Egyptian experience. An appendix stresses the common occurrence of human trichostrongylosis in Southern Iraq and of ascariasis throughout the country. Figures relating to the incidence of ancylostomiasis and other helminthic infections in the different provinces are given in a series of tables.

J.M.W.



(96c) Bailey reports the results of an intestinal parasite survey by faecal examination in the rural district of Tarmiya, 40 miles north of Baghdad. The results are summarized in a series of tables. The over-all infection rates found were *Ancylostoma duodenale* 54·8%, *Ascaris lumbricoides* 19·61%, *Enterobius vermicularis* 0·35%, *Strongyloides stercoralis* 0·35%, *Trichostrongylus* 0·35%, *Schistosoma haematobium* 1·77%, *Hymenolepis nana* 1·78%, *Taenia* 1·07%. No marked difference in the infection rates was observed between males and females or between adults and children. J.M.W.

# 97—Bulletin de l'Institut Français d'Afrique Noire. Série A: Sciences Naturelles.

- a. GOLVAN, Y. J., 1958.—“Acanthocéphales d'Afrique Occidentale française récoltés par le Dr. Pierre-Claude Morel.” 20 (1), 60–72.
- b. DOLLFUS, R. P., 1958.—“Le nom de genre *Centrorhynchus* Max Lühe 1911 (Acanthocéphales), rejeté à tort, est à conserver.” 20 (1), 286.
- c. DOLLFUS, R. P. & CAPRON, A., 1958.—“Un *Pygidiopsis* (Trematoda Heterophyoidea) de *Sterna* de la côte du Sénégal.” 20 (2), 306–310.
- d. DOLLFUS, R. P. & CAPRON, A., 1958.—“Un *Aephniidiogenes* (Trematoda Digenea) chez un *Labrax* (Serranidae) du Sénégal.” 20 (2), 311–319.
- e. BLANC, M., D'AUBENTON, F., OVAZZA, M. & VALADE, M., 1958.—“Recherches sur la prophylaxie de l'onchocercose en A.O.F. I. Étude hydrobiologique de la Bougouri-Bâ et essais de désinsectisation.” 20 (2), 634–674.

(97a) Golvan reports on a small collection of acanthocephalans from the neighbourhood of Dakar. Five mature females, three mature males and four young adults of a species of *Moniliformis*, unfortunately not sufficiently well preserved to allow more precise identification, were collected from *Cricetomys gambianus* but are rare in this host. *M. cestodiformis* occurred in *Aterix albiventris*; the praesoma is illustrated and the arrangement of the hooks discussed. *Centrorhynchus* (*Centrorhynchus*) *milvus* is recorded from *Milvus migrans parasitus*. *C. (C.) chabaudi* n.sp. from *Pseudogyps africanus* is described and figured; the new species is characterized by the proboscis armature, especially by each row of five small hooks at the level of the middle of the proboscis having shield-shaped roots. Juveniles of *Centrorhynchus* (*Centrorhynchus*) sp. were collected from *Varanus exanthematicus*, and of another species of *Centrorhynchus* and of a species of *Porrorhynchinae* from *Rana occipitalis*. S.W.

(97b) Previously [for abstract see Helm. Abs., 26, No. 77a] Dollfus & Golvan rejected *Centrorhynchus* Lühe, 1911 as a homonym of *Centrorhynchus* Steven or Fischer Waldheim, 1829. Dollfus has now examined a photocopy of this paper and has found that in it “*Centrorhynchus*” is a typographical error for *Centorhynchus* Germar, 1824. The rejection of *Centrorhynchus* Lühe, 1911 is therefore not justified and *Gordiorhynchus* Meyer, 1931 falls into synonymy with it. S.W.

(97c) Dollfus & Capron describe and illustrate *Pygidiopsis piclaumoreli* n.sp. from the intestine of a *Sterna hirundo* in Senegal. About 180 specimens were collected and this appears to be the first record of a species of *Pygidiopsis* in this host genus. Of the five species of *Pygidiopsis* hitherto described, only *P. pindoramensis* resembles the new form closely but *P. piclaumoreli* can be distinguished by its larger size and the larger eggs, by the vitellaria which do not extend so far posteriorly and by the position of the genital sinus against the anterior border of the ventral sucker. S.W.

(97d) Dollfus & Capron discuss the known species of *Aephniidiogenes* and illustrate and describe *A. senegalensis* n.sp. from *Labrax punctatus* at Dakar. This is the first species of this genus to be recorded from a host other than a member of the Pomadasyidae and a new geographical record. *A. barbarus*, *A. major* and *A. isagi*, the three other species regarded at present as valid, differ little from each other but Yamaguti has observed a true receptaculum seminis; in *A. senegalensis* there is a receptaculum seminis uterinum. The authors consider that the erection of the subfamily Aephniidiogeninae was well justified and that it has affinities with the Lepocreadiidae. S.W.

(97e) Blanc *et al.* give a detailed account of their investigations into the problem of preventing onchocerciasis along the course of the Bougouri-Bâ river in French West Africa. After describing the topography of the area they present the results of their physico-chemical studies of the local waters, tabulate and discuss its piscine fauna, and then proceed to a detailed discussion of the biology and ecology of the local species of *Simulium*. The paper concludes with a description of experiments on the eradication of the simuliid vectors by the use of larvicides, as a result of which it is concluded that a liquid form of D.D.T., free from kerosene and analogous substances and having a density of the order of 0.96, is most suitable for large-scale treatment.

J.M.W.

**98—Bulletin Mensuel de la Société Linnéenne de Lyon.**

- a. GUERRIER, P., 1958.—“Le mécanisme de la ponte chez deux espèces de nématodes libres.” 27 (2), 31–34.

**99—Bulletin. Ministry of Agriculture, Egypt. Veterinary Laboratories and Research Administration.**

- a. EZZAT, M. A. E., TADROS, G. & EL HALIM, M. I. A., 1958.—“Human schistosomes and other trematodes in sea-lions, *Zalophus californianus* from Giza Zoological Gardens.” No. 285, 20 pp. [Arabic summary 5 pp.]

(99a) Ezzat *et al.* report for the first time the finding of *Schistosoma haematobium* and *S. mansoni* and of *Heterophyes heterophyes* in sea-lions (*Zalophus californianus*). Autopsy and histopathological examination of four animals which died in the Zoological Gardens at Giza showed the primary cause of death to be acute schistosomiasis, the worms being present in enormous numbers in the portal and mesenteric veins and other visceral blood-vessels, in liver and kidney tissue and in the heart blood; while ova were abundantly distributed in the tissues of the lymphatic glands, lungs and liver. Curiously, the vesicular blood-vessels were free from adult worms and only scanty ova were present. The sea-lions were also infected with *Zalophotrema hepaticum*. Experiments on the viability of *S. mansoni* eggs led to the conclusion that no miracidia survive *in ovo* after 21 to 22 hours at 28° to 30°C. in undiluted faeces. The paper includes a useful summary of proven reservoir hosts of *S. haematobium* and *S. mansoni*.

J.M.W.

**100—Bulletin. Ministry of Agriculture, Fisheries and Food. London.**

- a. ROWLANDS, W. T., 1958.—“Diseases of sheep.” No. 170, v+38 pp.

(100a) In this illustrated bulletin, Rowlands aims to present a ready reference book to the shepherd at his job, on the diseases of sheep. His descriptions of the cause, symptoms, prevention and treatment of the various diseases are orientated under the four seasons of the year and embrace intestinal worms, lungworms, tapeworms, liver-fluke and the non-seasonal gid. A treatment calendar summarizes the preventive measures to be taken each season. G.I.P.

**101—Bulletin de la Société de Pathologie Exotique.**

- a. SANKALE, M., LE VIGUELLOUX, J., RIVOALEN, A. & MILHADE, J., 1958.—“La place des zoonoses dans la pathologie du Soudan français.” 51 (2), 203–208. [Discussion pp. 208–209.]
- b. LARTIGUE, J. J., RANDRIANARISON & RAKOTONDRAMANGA, 1958.—“Foyer de filariose canine à *Dirofilaria immitis* dans le district de Maroantsetra.” 51 (2), 270.
- c. LARIVIÈRE, M., ARETAS, R., RABA, A. & CHARNIER, M., 1958.—“Index d'infestation bilharzienne au Sénégal.” 51 (2), 272.
- d. FLOCH, H. & MAILLOUX, M., 1958.—“Action de la désoxybenzoïne sur les parasites intestinaux.” 51 (3), 322–325. [Discussion p. 325.]



- e. CHARMOT, G. & REYNAUD, R., 1958.—“ L'acétazolamide dans le traitement des oedèmes carentiels de l'enfant.” 51 (3), 350-353.
- f. CHABAUD, A. G. & LARIVIERE, M., 1958.—“ Sur les oesophagostomes parasites de l'homme.” 51 (3), 384-393. [Discussion p. 393.]

(101a) In the French Sudan echinococcosis is common in animal hosts but rare in man. Cysticerciasis is prevalent in cattle and taeniasis is consequently frequent among certain tribes, the members of which not only consume raw meat but also consider tapeworm infection as a sign of good health. J.M.W.

(101d) Floch & Mailloux, working in Cayenne, treated 50 children suffering from helminthiasis with oral doses of Désoine (desoxybenzoin) at the rate of 7 mg. per kg. body-weight daily for seven days followed by a week's rest, repeated three times. No toxic side effects were observed. The drug in this dosage was ineffective in a single case of ancylostomiasis, and produced apparent cure in only four out of 32 cases of ascariasis; but in four out of four cases of strongyloidiasis and 11 out of 17 cases of trichuriasis the stools were completely negative after the full course of treatment. J.M.W.

(101e) Charmot & Reynaud, working in Brazzaville, treated with acetazolamide six children varying in age from 18 months to six years and suffering from oedematous syndromes (due in two cases to kwashiorkor and in four to severe ancylostomiasis with advanced anaemia). Rapid reduction of the oedema accompanied by marked loss of weight was observed in all cases. Tolerance was excellent in five cases. The sixth case died in a diarrhoeic condition 36 hours after cessation of treatment, which was not considered to be responsible for the fatal termination. J.M.W.

(101f) Chabaud & Larivière describe an immature female of *Oesophagostomum stephanostomum* removed, at Dakar, from a subcutaneous nodule in a seven to eight-year-old child from a forest zone of the Ivory Coast where monkeys are abundant. The nomenclature of the species of this genus is discussed and it is concluded that, following the work of Travassos & Vogelsang (1932), there exist only eight valid species in primates, the synonymy of which is given. The reported human cases of oesophagostomiasis are reviewed and ranged within three species only, namely, *O. stephanostomum* in Africa and South America; *O. bifurcum* in Africa; and *O. aculeatum* in Asia. Comparative consideration of the biology and pathogenesis of *Oesophagostomum* spp. leads the authors to conclude that man is not a normal host of these parasites. J.M.W.

## 102—Bulletin de la Société Zoologique de France.

- a. ANDERSON, R. C., 1958.—“ On the classification of the Filarioidea with special reference to the Filariidae and the Stephanofilariidae.” 83 (1), 144-157.

(102a) Anderson points out that the classification of some Filarioidea according to the shape of the first-stage larva and its possession or lack of spines has received confirmation from recent work on the life-cycles of some of these worms. He believes that the following characters are taxonomically important: the type of egg (thin- or thick-shelled); the level of development of the first-stage larva (differentiated or microfilaroid); the type of life-cycle (larvae or eggs reach the external environment, or larvae taken up from the tissues by a haematophagous arthropod); and the taxonomic group of the definitive host. The following changes are made within the Filarioidea: (i) *Setaria* combines cephalic ornamentation in the adult and cuticular spines in the larva with the production of microfilariae and a dipetalonematid type of life-cycle. *Papillosetaria* and *Skryabinaria* also have cephalic ornamentation and they probably produce microfilariae. These three genera are transferred from the Dicheilonematinae Wehr, 1935 to the Stephanofilariidae Wehr, 1935, which thus contains genera which are parasitic in large mammals and show some primitive and some specialized features. There are two subfamilies, Setariinae Yorke & Maplestone, 1926 and Stephanofilariinae Skryabin & Shikhobalova, 1945. (ii) *Suifilaria* is transferred from the Dicheilonematinae to the Filariinae

Stiles, 1907 because it has a parastomal vulva, very unequal spicules, a well developed buccal cavity, caudal alae and large caudal papillae, and inhabits the subcutaneous tissues of its mammalian host. (iii) The remaining genera of the Dicheilonamatinae are parasites of reptiles and birds, and they, together with the Diplotriacinae Skryabin, 1916, are joined in the Diplotriacinidae n.fam., which are characterized by having epaulettes, tridents or tooth-like circumoral elevations; oesophagus clearly divided; spicules unequal, complex and dissimilar; first-stage larva differentiated and possessing spines. The Filariidae Claus, 1885 comprise the Filariinae Stiles, 1907, Aprocinae Yorke & Maplestone, 1926 and the Tetracheilonematinae Wehr, 1935; they nearly always lack cephalic ornamentation, they generally have an indistinctly divided oesophagus and they have a fully differentiated first-stage larva which has anterior spines, and, when it is short and stout, posterior spines. (iv) *Icosiella* is held to be a dipetalonematid because of its life-cycle, and is transferred from the Stephanofilariidae to the Icosiellinae n. subf. of the Dipetalonematidae. The Icosiellinae are distinguished from the other subfamilies by having the four most anterior cephalic papillae spinous. It is considered that *Wymania* is a member of the Onchocercinae and that *Anhingofilariinae* Wehr & Hwang, 1957 is therefore not valid.

W.A.F.W.

### 103—Bulletin of the World Health Organization.

- a. ABDEL MALEK, E., 1958.—“Distribution of the intermediate hosts of bilharziasis in relation to hydrography: with special reference to the Nile Basin and the Sudan.” 18 (5/6), 691-734. [French summary p. 732.]
- b. PITCHFORD, R. J., 1958.—“Bilharziasis in Swaziland.” 18 (5/6), 735-750. [French summary pp. 749-750.]
- c. GAUD, J., 1958.—“Rythmes biologiques des mollusques vecteurs des bilharzioses. Facteurs saisonniers et climatiques influençant le cycle de reproduction de *Bulinus truncatus* et de *Planorbarius metidjensis* en Afrique du Nord.” 18 (5/6), 751-769. [English summary pp. 768-769.]

(103a) Abdel Malek gives an extensive description of the general geographical features of the Sudan and Nile valley and of certain vectors of *Schistosoma haematobium* and *S. mansoni* collected over a period of three years. The vectors are species of *Biomphalaria* and *Bulinus*. The author considers that a knowledge of the pre-history of the region is important for an appreciation of the snail distribution, and lays emphasis on the influence of climate and rivers on fresh-water snail population. There appears to be a gradual extension of *Biomphalaria* along the Nile to the south.

W.K.D.

(103b) In Swaziland *Bulinus* is wide-spread in the low veld and middle veld areas, but very rare on the high veld. *Biomphalaria pfeifferi* is numerous on low veld, sparse on middle veld and apparently not found on the high veld. The distribution of *Schistosoma mansoni* is patchy, and it is only found up to about 750 metres. *S. haematobium* is present in the low and middle veld and its distribution is more uniform than that of *S. mansoni*. Bilharziasis has been found in cattle at the Bremersdorp abattoir. Private farmers are not alive to the human disease risk. In view of rice-growing snail infection is inevitable and drying of the fields is not sufficient to kill them, so the protection of weeders is not possible. A large scale treatment programme is not in operation and Pitchford considers it useless unless anti-snail measures are carried out at the same time, with improvement of migration schemes and of native settlements in the rural areas. Basic survey work to ascertain correct incidence is necessary. Recommendations for control are made.

W.K.D.

(103c) Seasonal and climatic factors have an action on vector biology. In North Africa the vectors of *Schistosoma haematobium* are *Bulinus truncatus* and *Planorbarius metidjensis* though the latter is doubtful. The development of *Bulinus* is very different from that of *Planorbarius* seasonally. A two-year study of *Bulinus* showed egg-laying to be least in winter and a great seasonal variation in the time taken to reach sexual maturity. The life span can be up to 21 months. There is a close parallel between growth and fecundity, and water temperature.



## 103—Bulletin of the World Health Organization (cont.)

- d. DE MEILLON, B., FRANK, G. H. & ALLANSON, B. R., 1958.—“Some aspects of snail ecology in South Africa. A preliminary report.” 18 (5/6), 771–783. [French summary p. 783.]
- e. ABDEL MALEK, E., 1958.—“Factors conditioning the habitat of bilharziasis intermediate hosts of the family Planorbidae.” 18 (5/6), 785–818. [French summary pp. 815–816.]
- f. HARRY, H. W. & ALDRICH, D. V., 1958.—“The ecology of *Australorbis glabratus* in Puerto Rico.” 18 (5/6), 819–832. [French summary pp. 831–832.]
- g. WATSON, J. M., 1958.—“Ecology and distribution of *Bulinus truncatus* in the Middle East. With comments on the effect of some human activities in their relationship to the snail host on the incidence of bilharziasis haematobia in the Middle East and Africa.” 18 (5/6), 833–894. [French summary pp. 891–892.]

The present molluscicides have the disadvantages that they do not destroy the snail population completely, are less effective against the eggs than against the adults, and because of their high cost create a tendency to reduce the number of treatments per year below the necessary minimum. W.K.D.

(103d) This is a preliminary report and summary of one year's study of the ecology of *Biomphalaria pfeifferi* and *Physopsis africana* in parts of the Transvaal. On the high veld (above 1,200 m.) *Physopsis* was present but not *Biomphalaria*. No significant differences were found in the chemical composition of the waters examined which do or do not harbour vectors. Vectors were not found in waters regularly receiving sewage effluents. W.K.D.

(103e) Altitude (even 6,000 ft.) does not affect planorbid distribution. Temperature has little effect on distribution but does affect reproduction. High turbidity of water is an unfavourable factor as are also swift currents which *Bulinus* can withstand better than *Biomphalaria* or *Physopsis*. Moderate pollution by human and animal excreta is a favouring factor. A proportion of both *Bulinus* and *Biomphalaria* will survive drying for as long as three-and-a-half months. A muddy bottom is favourable to the snails, but cementing irrigation canals is not a very efficient preventive. *Bulinus* is less tolerant of salinity than *Biomphalaria*. High magnesium content of the water is unfavourable. Normal pH range is from 6.0 to 9.0 but planorbid has been found in Brazil in water with a pH as low as 4.0. Biological control by predators has not proved satisfactory. Factors favouring the development of bacteria pathogenic to the snails should be encouraged. W.K.D.

(103f) In Puerto Rico the vector of *Schistosoma mansoni* infections is *Australorbis glabratus* which has an irregular distribution; other Planorbidae occur also. The incidence of the disease varies in different parts of the island, but is highest in the low-lying alluvial areas, although stream gradient is not the only factor favouring snail infestation. Random sampling of snail populations showed *S. mansoni* infections always to be less than 10% and usually less than 1%. Laboratory experiments showed that concentrations of zinc, copper, cadmium and silver of 0.5–1.0 p.p.m. produced a reversible distress syndrome in the snail but snails were killed at concentrations of more than 1.0 p.p.m. W.K.D.

(103g) This is a widely ranging survey of factors affecting the vector distribution over an area of several millions of square miles, with an especial comparison of the conditions in the valleys of the Nile and Tigris-Euphrates. Infestation is largely confined to stagnant or slowly flowing streams and the snail prefers polluted water. An abundant growth of unicellular algae is essential to the establishment of breeding colonies. Irrigation channels provide the most favourable habitat; the importance of lift irrigation is pointed out as snails can pass through rotary centrifugal pumps. Water temperature is the principal factor governing reproductive activity but salinity is an important limiting factor; the snail is less tolerant of heat than of cold. No predators are of significance, and human activities have favoured snail-human contact as pollution with human excrement appears to provide a very favourable factor. The incidence is high in certain rice-growing areas and there is a danger of spread in arid areas at water-holes. For control, drainage of marshy areas, elimination of borrow-pits, piping of irrigation channels, frequent drying for short periods are all suggested. Reliable information on the life-cycle and longevity of *Bulinus truncatus* is scarce. W.K.D.

**103—Bulletin of the World Health Organization (cont.)**

- h. BARBOSA, F. S. & OLIVIER, L., 1958.—“Studies on the snail vectors of bilharziasis mansoni in north-eastern Brazil.” **18** (5/6), 895–908. [French summary pp. 906–907.]
- i. BUTTNER, A., 1958.—“Le complexe ‘mollusque-schistosome’ au Brésil.” **18** (5/6), 909–929. [English summary pp. 927–928.]
- j. VIANNA MARTINS, A., 1958.—“Non-human vertebrate hosts of *Schistosoma haematobium* and *Schistosoma mansoni*.” **18** (5/6), 931–944. [French summary pp. 942–943.]
- k. PELLEGRINO, J., 1958.—“The intradermal test in the diagnosis of bilharziasis.” **18** (5/6), 945–961. [French summary pp. 958–959.]
- l. WRIGHT, W. H., DOBROVOLNY, C. G. & BERRY, E. G., 1958.—“Field trials of various molluscicides (chiefly sodium pentachlorophenate) for the control of aquatic intermediate hosts of human bilharziasis.” **18** (5/6), 963–974. [French summary pp. 973–974.]

(103h) In north-eastern Brazil *Schistosoma mansoni* infections are transmitted by *Australorbis glabratus* and *Tropicorbis centimetralis*, but the former is the better vector and the latter may not be an effective vector unless the snail density is high. Fluctuations in apparent reproductive activity occur without known cause; some of the habitats are dry for five to seven months every year. Under field conditions desiccated snails have been found to harbour immature infections suggesting that these may be carried over from one wet season to the next. W.K.D.

(103i) In the last few years there has been in Brazil a rapid invasion by *Schistosoma mansoni* with an infestation rate of 90% in certain areas. Two species of Planorbidae, *Australorbis glabratus* and *A. centimetralis* are responsible, the former in the south and the latter in the north-east; *A. glabratus* is the better vector. The rainy season has a direct influence while the terrain is exceptionally favourable to extension. The absence of snails in the Amazon basin is associated with a pH of less than 5.0 but recently foci have been found in the lower Amazon basin. In the north the reproductive cycle takes only one month; both human and animal infections are found. In certain rodents and marsupials schistosomes indistinguishable from human *S. mansoni* have been found. Infection can remain in the diapause for three months, then normal development can occur again. Migration of labour especially in the southern provinces has introduced infection into areas where it was previously absent but the enormous size of the country and the wide-spread human and animal infection make the problem of control an almost impossible one. W.K.D.

(103j) Many mammals are of great importance in the epidemiology of *Schistosoma japonicum* and, except the cloven-hoofed mammals, relatively few are totally resistant to *S. mansoni* infections, but *S. haematobium* shows a stricter host specificity. Natural infections of *S. mansoni* occur in certain monkeys, insectivores and rodents and in Brazil the infection rate of *Rattus rattus* is very high. Natural infections with *S. haematobium* in animals other than man are practically non-existent. The taxonomy of rodent schistosomes is not yet settled. W.K.D.

(103k) Pellegrino reports on various methods of concentration of cercariae for use as antigens in the intradermal test. The use of digestive gland extracts or heterologous antigens is not advised. A polysaccharide may not be the only active fraction. Tests in the scapular region give a more intense reaction than on the volar surface of the forearm. Injections of 0.01–0.05 ml. of antigens diluted 1:10<sup>3</sup> or 1:10<sup>4</sup> are used. The reaction is normally immediate and reaches a maximum after 15 minutes; wheals of areas equal to or greater than 1.2 sq. cm. are positive. The intradermal test is positive in 90% of bilharzia patients, with proper antigen, but is of no value in the assessment of cure. W.K.D.

(103l) Field trials of 38 chemicals as molluscicides were conducted in various States of Brazil, and a pilot trial of an area 25 sq. km. was carried out in Egypt with sodium pentachlorophenate. Tests in Brazil were carried out under very varied conditions of terrain, rainfall etc. and the chemicals were applied in various ways. Briquettes or balls were best in running water, and a spray was useful on dry ground and along the banks of streams. Sodium



**103—Bulletin of the World Health Organization (cont.)**

- m. PAULINI, E., 1958.—“Bilharziasis control by application of molluscicides. A review of its present status.” **18** (5/6), 975–988. [French summary pp. 985–986.]
- n. BLAIR, D. M., 1958.—“Lucanthone hydrochloride. A review.” **18** (5/6), 989–1010. [French summary p. 1009.]
- o. LANOIX, J. N., 1958.—“Relation between irrigation engineering and bilharziasis.” **18** (5/6), 1011–1035. [French summary pp. 1033–1034.]
- p. McMULLEN, D. B. & HARRY, H. W., 1958.—“Comments on the epidemiology and control of bilharziasis.” **18** (5/6), 1037–1047. [French summary pp. 1045–1047.]

pentachlorophenate proved most satisfactory. Dose rates varied but were best in a concentration of 10 to 20 p.p.m. for eight hours or longer. This gave a snail reduction of 90% or more for four months in approximately 40% of streams surveyed. Snails on dry ground are relatively resistant, so it is best used following the first heavy rain. There are so many variables that no one chemical can universally be the best. W.K.D.

(103m) Paulini gives an extensive description of the chemicals used, strengths, and exposure times of various molluscicides. Methods of application are of great importance and it is generally considered that concentrations of less than 10 p.p.m. are less expensive than higher concentrations for a shorter time. Briquettes of sodium pentachlorophenate and water are easily made, but the dust of the chemical is irritating to workers. Sodium pentachlorophenate is not affected by soft mud so much as copper. Egg clusters are more resistant to copper sulphate and less so to sodium pentachlorophenate than adults. There is no evidence yet of snails becoming resistant to molluscicides, but a number of factors require further study. W.K.D.

(103n) Blair reviews published work on the treatment of schistosomiasis with lucanthone hydrochloride. All the miracils are most active against sexually mature worms. Out of 82 African children, with either *Schistosoma haematobium* or *S. mansoni* infections, given 60 mg. per kg. body-weight twice a day for 3–6 days more than 85% ceased to pass living eggs and none relapsed up to 12 weeks. Careful standards of cure and of follow-up procedure are essential. In Southern Rhodesia lucanthone hydrochloride has been the standard drug since 1950, used in tablets, the average dose per patient being 3.5 gm. Sugar or enteric-coating of the tablets impairs action without reducing the frequency of side effects which develop in a high proportion of patients but are less frequent in Africans than Europeans. Very short courses or massive single doses should be considered for mass treatment. The dose suggested is 60 mg. per kg. per day for two days, one dose per day, and this might even be reduced if a single massive dose is given. W.K.D.

(103o) In this discussion of the relation between irrigation systems and the transmission of schistosomiasis, Lanoix points out that spread by irrigation is the most menacing feature of the *Bulinus* problem and stresses that wherever possible the irrigation channels should be lined. Mention is made of Marill's work during which he found snails in an irrigation works fed from infested streams by pumps operating at 600–800 revolutions per minute. Screening is impracticable because of the small size of the snail. The high initial cost of concreting is balanced by longer life and less maintenance; the use of concrete pipes is also advised for low-pressure water pipelines. The present lack of co-operation between engineers and health staff shows the need for this and for research on the most suitable types of construction. W.K.D.

(103p) The importance of reservoir hosts, especially for *Schistosoma mansoni*, is emphasized and it is pointed out that attempts to eliminate the vectors are only a secondary part of the question of control. The expense of molluscicides is a severe handicap for total area use as yearly application is inadequate. For a complete programme, successful co-ordination in eliminating the vectors and the reservoir hosts, combined with the treatment of human cases and the prevention of pollution by human excreta is essential. W.K.D.

**103—Bulletin of the World Health Organization (cont.)**

- q. PITCHFORD, R. J., 1958.—“Bilharziasis survey in Basutoland, March 1956.” 18 (5/6), 1049–1050.
- r. PITCHFORD, R. J., 1958.—“Bilharziasis survey in Bechuanaland, March 1956.” 18 (5/6), 1050–1052.
- s. FRAGA DE AZEVEDO, J., 1958.—“Human bilharziasis in the British Cameroons.” 18 (5/6), 1052–1057.
- t. MARILL, F. G., 1958.—“Sur l’appréciation comparative de la richesse des gîtes en mollusques fluviatiles notamment en *Bulinus truncatus* Audouin.” 18 (5/6), 1057–1064.
- u. MARILL, F. G., 1958.—“Sur les variations de la composition chimique de l’eau et les variations d’abondance de *Bulinus truncatus* Audouin.” 18 (5/6), 1064–1070.
- v. ALVES, W., 1958.—“Chemical constituents of surface water in Southern Rhodesia, with special reference to the molluscan vectors of bilharziasis.” 18 (5/6), 1071.

(103q) This survey of bilharziasis in Basutoland was confined to the narrow and comparatively flat western strip. Here the mean annual rainfall is 400–500 mm. Bilharziasis is rare but *Bulinus tropicus* and *Lymnaea* spp. are present, the former being especially numerous. Rectal biopsies on 98 schoolchildren from all over the territory in March 1956 were all negative.

W.K.D.

(103r) Of the two main areas of Bechuanaland Protectorate, the eastern is flat and populated. Here *Bulinus globosus*, *B. tropicalis*, *B. forskalii*, and *B. africanus* occur and *Schistosoma haematobium* infections are present in certain large villages where the rate is at least 65% in children. In the north-western area (Ngamiland) no case of bilharziasis has ever been reported, possibly due to the sparse population and frequent winter frosts, but *B. africanus*, *Biomphalaria* sp. and *Lymnaea* spp. were found, although the snail population was very small.

W.K.D.

(103s) Fraga de Azevedo gives an historical and epidemiological account of schistosomiasis in man in the British Cameroons, where it has been known since before the tenth century. The country has two main areas, the north which is semi-arid, and the south which has large forests and is equatorial in character. Investigation of one area in the north, near Lake Chad, showed only 9% to be infected with vesical bilharziasis. In the south only the vesical form is known, and it is found in the foci where the *Schistosoma haematobium* rate is very high and where *Bulinus* and *Biomphalaria* are present. In the north *Biomphalaria* and *Bulinus* spp. are abundant; conditions are very favourable for their development and the risk of spread of the disease is great. It may also be spread by migration of the population.

W.K.D.

(103t) Marill carried out a survey, by means of home-made snail traps, of a small area of water about 35 km. south of Algiers. A number of snails were found including *Bulinus* spp., *Planorbarius*, *Physa*, *Lymnaea* and *Ancylus*. *Planorbarius* were most frequent. Egg-laying was less on the traps themselves than at the places where they were sited. These traps offer a cheap and easy way of catching snails, checking egg-laying and collecting young ones as well as adults.

W.K.D.

(103u) A survey of a siphon well and a balancing tank in the Oran area revealed the presence of *Bulinus*, *Physa* and *Melanopsis* spp. The last mentioned was found only once during the period of the investigation (1948–56). The chemical composition of the waters was estimated repeatedly but no correlation was found with the frequency of *Bulinus*.

W.K.D.

(103v) In Southern Rhodesia the waters are seldom very acid or below pH 5.0. Forty-one samples from snail-free waters showed high magnesium and low calcium content. Seventy-three samples from snail-infested waters were usually polluted with human excreta suggesting that this plays an important part in providing a growth factor not revealed by water analysis.

W.K.D.



**103—Bulletin of the World Health Organization (cont.)**

- w. HUBENDICK, B., 1958.—“Factors conditioning the habitat of freshwater snails.” 18 (5/6), 1072–1080.
- x. PITCHFORD, R. J., 1958.—“Animal reservoirs of human bilharziasis in the Eastern Transvaal.” 18 (5/6), 1080–1081.
- y. GAUD, J., 1958.—“Rôle de la géographie humaine et des activités sociales des divers groupes d'une collectivité dans l'épidémiologie des bilharzioses.” 18 (5/6), 1081–1087.
- z. PITCHFORD, R. J., 1958.—“Influence of living conditions on bilharziasis infection rates in Africans in the Transvaal.” 18 (5/6), 1088–1091.
- ba. ALVES, W., 1958.—“The distribution of *Schistosoma* eggs in human tissues.” 18 (5/6), 1092–1097.

(103w) Hubendick discusses the factors conditioning the habitat of fresh-water snails, limiting the concept of habitat to that part of the environment which affects the snails more or less directly and to which the snails give an ecological and physiological response. In general the ecological requirements of the different species of fresh-water snails, which in the main have a wide ecological tolerance, differ quantitatively rather than qualitatively. He concludes that to change the ecological conditions of the snails' habitats will be a more effective control measure than treatment with a molluscicide. s.w.

(103x) Pitchford reports that in the Eastern Transvaal cattle, sheep and goats were found to have adult *Schistosoma* sp. in the mesenteric veins, and lesions and ova in the bladder. Similar ova were found in 5% to 10% of the African children at Komatipoort. The ova are distinct from those of *S. haematobium*, being longer, with a well marked shoulder in front of the spine and the anterior end well drawn out. They were always found mixed with those of *S. mansoni* and occasionally with those of *S. haematobium*. s.w.

(103y) As there are still enormous areas where schistosome vectors are present but not the diseases, Gaud suggests that not only the snail but also human factors associated with social activities must be important. As examples of this he quotes the facts that in Morocco there is extensive infection in Moslem children but little in Moslem women, due to Moslem customs, while on the contrary Moroccan Jewesses are severely infected, and Jewish children much less so. A comparison is made between the customs and infections in West and Central Africa, Madagascar and Egypt. Concentrations of human population are very important and also the migration of infected persons. Sometimes the disease is almost “occupational”. W.K.D.

(103z) Investigations into human bilharziasis were carried out in the Eastern, Northern and Western Transvaal on Bantu, no persons over 19 years being included; the results were reported on one ordinary specimen of urine, or concentrated stool, or one rectal biopsy examination. In the Eastern area the percentage of *Schistosoma haematobium* infections was almost identical whether in reserves, farms, or townships; for *S. mansoni* the percentage infection rate for the reserves was less than for farms or townships. *S. mansoni* is closely related to human concentrations where piped water and latrine facilities are lacking. In the north similar conditions occur but the infection rate is lower except in one area where children congregate for bathing. In the west (Rustenburg area) the *S. haematobium* infection rate is low, while *S. mansoni* is not found. The author concludes that the infection rate for *S. mansoni* is correlated with living conditions—density of population and nature of water supplies—but the infection rate for *S. haematobium* is not, unless safe bathing is provided. W.K.D.

(103ba) Various organs obtained from the bodies of 200 Bantu were examined for schistosome eggs after cutting up and digestion with 10% potassium hydroxide; new-born and very young infants were excluded. The results showed a *Schistosoma haematobium* infection rate of 86.5%. In 42 no *S. haematobium* eggs were found in the bladder, although they were present in the uterus and adnexa, liver, appendix, spleen, and brain. 55% of appendices examined showed *S. haematobium* eggs and 6% *S. mansoni* eggs. Forty-six out of 150 brains examined contained either *S. haematobium* or *S. mansoni* eggs; the liver was next in frequency to the rectum in *S. mansoni* infections. 50% showed a lung infection with *S. haematobium* ova.

**103—Bulletin of the World Health Organization (cont.)**

- bb. VOGEL, H., 1958.—“Acquired resistance to *Schistosoma* infection in experimental animals.” **18** (5/6), 1097–1103.
- bc. WALKER, A. R. P., 1958.—“Studies on parasitism and the nutritional state.” **18** (5/6), 1103–1105.
- bd. RODRIGUEZ-MOLINA, R., OLIVER-GONZÁLEZ, J. & SERRANO, D. G., 1958.—“Studies on immunity to bilharziasis mansonii: evaluation of the circumoval precipitin test.” **18** (5/6), 1105–1107.
- be. DE MEILLON, B. & HOLLINGHAM, E. A., 1958.—“Observations on the Bilharzia complement-fixation test in schoolchildren after successful treatment.” **18** (5/6), 1108–1109.
- bf. ALVES, W., 1958.—“Further studies on the treatment of urinary bilharziasis with lucanthone hydrochloride.” **18** (5/6), 1109–1111.

*S. mansonii* eggs were present in the rectum in 28% and *S. haematobium* ova in no less than 72%. Forty out of 70 cases showed *S. haematobium* eggs in the uterus and adnexa, four both *S. haematobium* and *S. mansonii*, and one *S. mansonii* only. Alves considers the disease is almost universal, and the risk of extension due to increased provision and use of water, is great. W.K.D.

(103bb) Vogel reports experiments on the resistance of rhesus monkeys to repeated infections with *Schistosoma japonicum*. The symptoms produced were chiefly those of intestinal illness and the output of eggs in the faeces was roughly parallel to the severity of the disease. Initial infections with 800 to 1,500 cercariae of both sexes proved fatal but when 200 to 400 cercariae were used there was little deterioration in the condition of the monkeys although egg output was moderately high. The monkeys were then re-infected at different intervals with varying numbers of cercariae and it was found that there was a gradual development of partial and later complete resistance. A few male and female worms, smaller than normal, were always recovered at autopsy from those monkeys which had shown complete resistance, indicating that the state may be one of premunity. One animal appeared to show a genuine, persistent immunity. Further experiments on four monkeys showed that unisexual infections with *S. japonicum* may also lead to complete resistance to subsequent bisexual infections. S.W.

(103bc) In the Bantu, blood loss in *Schistosoma haematobium* infections is unlikely to cause anaemia but may aggravate an existing anaemia. In *S. mansonii* infections blood loss is very small. Several groups of Bantu children and adults suffering from both types of bilharziasis were investigated but the number of cases of anaemia was negligible. As regards the general physical condition the handicap of *S. haematobium* in children may be less than usually believed. W.K.D.

(103bd) In Puerto Rico the majority of *Schistosoma mansonii* infections seem to be acquired in childhood or adolescence. The circumoval precipitin test was carried out in 46 cases of *S. mansonii* infection; details of the technique are given. The results showed 43 out of 46 to be positive; when the test was repeated in the three negative cases two had dead ova in the stools and rectal tissues and one had living ova in both. No reason for this last result was found. W.K.D.

(103be) A complement fixation test using a cercarial antigen from *Schistosoma haematobium* was carried out on a number of European boys and girls aged 14–17 years all of whom had urine positive for *S. haematobium*. Only those who were successfully treated and who remained negative throughout the 40 months' study are included. Eighteen were tested at the start. The test was less consistent as time passed, and it cannot be used to assess cure within 40 months unless consistently negative. W.K.D.

(103bf) Two series of African patients, all showing eggs of *Schistosoma haematobium* in the urine were treated with lucanthone hydrochloride. In the first, 180 boys aged 12 to 19 years from an Industrial School for Africans were given 60 mg. per kg. body-weight for three days, orally; all patients were followed up for six months, and the apparent cure rate was 90%. In the second, 69 children aged 8 to 14 years were given the same dosage rate as in the first series. They were followed up for 14 weeks. The apparent cure rate was 80%. There were side effects in both series but lucanthone hydrochloride is considered the drug for a mass campaign of treatment. W.K.D.



**103—Bulletin of the World Health Organization (cont.)**

- bg. PITCHFORD, R. J., 1958.—“Observations on the mass treatment of bilharziasis in South Africa.” **18** (5/6), 1112–1113.
- bh. HUBENDICK, B., 1958.—“A possible method of schistosome-vector control by competition between resistant and susceptible strains.” **18** (5/6), 1113–1116.

(103bg) Pitchford has made a comparison of Nilodin and Miracil-D in total doses of 130 mg. per kg. body-weight in adults and children suffering from *Schistosoma haematobium* or *S. mansoni* infections in various parts of the Transvaal. One stool and one urine sample were examined before and after treatment, by the acid-ether and non-centrifuge techniques. The results were not satisfactory. Of 200 Africans treated with foudadin, only 41 completed the course because of the intramuscular injections. The author concludes that mass treatment with the present drugs available is of doubtful value in South Africa. W.K.D.

(103bh) Hubendick discusses briefly the possibility of controlling schistosome vectors by competition between susceptible and resistant strains of snails. There is more or less direct proof that various strains of snails differ in susceptibility to schistosome infections; some are refractory. Where susceptible and refractory strains of host live together in water infected with schistosomes, natural selection will favour the resistant strain. W.K.D.

**104—California Agriculture.**

- a. SHER, S. A. & MUNNECKE, D. E., 1958.—“Nematodes and bacteria on rose.” **12** (9), 9–10.

(104a) Root-lesion nematodes, *Pratylenchus vulnus*, and hairy-root bacterium cause serious damage to field-grown rose crops in southern California. In green-house tests rose cuttings in field soil fumigated with D-D, EDB or chloropicrin made better growth than others in untreated soil, which showed the typical symptoms of stunting, chlorosis and reduced root systems. Root-lesion nematodes remained numerous in the unfumigated controls but were eliminated by fumigation. In another series of experiments *P. vulnus*, *Trichodorus christiei* or a mixture of the two species were introduced to steam-sterilized soil in which roses were grown. Disease symptoms occurred only in the presence of *P. vulnus*, and this was the only species of nematode recovered from any of the infested soils after a year. Fumigation tests with chloropicrin, D-D, EDB, Vapam as a drench or injected, carried out in a field heavily infested with *P. vulnus* and subsequently planted with roses resulted in marked increase in growth of the plants which was correlated with a decrease in the numbers of *P. vulnus* in the soil after nine months. At the end of two years plant growth still showed a striking improvement in the fumigated plots. M.T.F.

**105—Canadian Journal of Botany.**

- a. TOWNSHEND, J. L., 1958.—“The effect of *Pratylenchus penetrans* on a clone of *Fragaria vesca*.” **36** (5), 683–685.

(105a) Ten runner plants of *Fragaria vesca* grown in sterile soil were inoculated with *Pratylenchus penetrans*. Each plant received an inoculum consisting of vetch roots containing 150 *P. penetrans* originating from strawberry and cultured on successive plantings of vetch. After five week's growth the increase in the number of petioles, in total length of the petioles and in fresh weight was significantly greater in the control plants than in the inoculated. An average of 1,248 nematodes per plant was extracted from the roots which were severely stunted and had dark brown lesions in which nematodes were usually found. *P. penetrans* therefore appears to be a primary parasite of strawberry but it is stressed that fungi and bacteria are associated with the nematodes in the root lesions. M.T.F.

**106—Canadian Journal of Comparative Medicine and Veterinary Science.**

- a. O'DONOGHUE, J. G., 1958.—“Clinical trials with cyanacethydrazide for the treatment of lungworms in cattle and sheep.” **22** (7), 237–239.
- b. WEBSTER, G. A., 1958.—“A report on *Toxocara canis* Werner, 1782.” **22** (8), 272–279.

- c. ABDOU, A. H., 1958.—“The life-cycle of *Davainea proglottina* Davaine and relation between the proglottids discharged daily and the number of tapeworms in the domestic fowl.” 22 (10), 338-343. [French summary p. 367.]

(106a) The author describes two field trials with cyanacethydrazide for the treatment of lungworm infections in cattle and sheep. In both trials remarkable effects were seen with doses of 15 mg. per kg. body-weight given by either the oral or subcutaneous route. Two doses given a week apart were sufficient to rid calves of the symptoms of the infection and to return them to a normal thrifty state. A single treatment with this compound was adequate to clear the majority of sheep from an infection with lungworms.

K.H.

(106b) Webster reviews existing information with regard to *Toxocara canis* infection of dogs and foxes as an economic and public health problem. After giving an account of the life-history of the parasite and the associated histopathology in the host, she discusses the important problems of prenatal infection in the canine host and production of visceral larva migrans in man.

J.M.W.

(106c) Abdou describes the life-history of *Davainea proglottina*. When infected slugs (*Agriolimax reticulatus*, *Arion ater*, *A. hortensis*, *A. circumscriptus*, *Milax gracilis* or *M. sowerbyi*) were fed to fowls the outer covering of the cysticeroid was digested by the gastric juice and the head emerged in the duodenum. The tapeworms became sexually mature in 10 to 13 days and the fowls commenced to shed gravid proglottides from the 11th to the 14th day after infection. Most of the proglottides were shed during the late afternoon; they were not immediately infective to slugs; under favourable conditions the oncospheres remained viable for four to five days but they were not resistant to desiccation. There appeared to be no relation between the number of cestodes in the fowl and the number of proglottides passed.

S.W.

### 107—Canadian Journal of Zoology.

- a. STEINER, G., 1958.—“*Monhystera cameroni* n.sp.—a nematode commensal of various crustaceans of the Magdalen Islands and Bay of Chaleur (Gulf of St. Lawrence).” 36 (3), 269-278.
- b. PRICE, J. L., 1958.—“Cryptic speciation in the *vernalis* group of Cyclopidae.” 36 (3), 285-303.
- c. RONALD, K., 1958.—“The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. IV. Cestoda.” 36 (3), 429-434.
- d. WEBSTER, G. A., 1958.—“On prenatal infection and the migration of *Toxocara canis* Werner, 1782 in dogs.” 36 (3), 435-440.
- e. LAIRD, M., 1958.—“Parasites of South Pacific fishes. III. Trematodes from the Solomons and New Hebrides, with a description of *Daitreosoma parva* n.sp. (Monogenea) from Guadalcanal.” 36 (3), 441-446.
- f. PREMVATI, 1958.—“Studies on *Strongyloides* of primates. III. Observations on the free-living generations of *S. fülleborni*.” 36 (3), 447-452.
- g. GIBBS, H. C. & TENER, J. S., 1958.—“On some helminth parasites collected from the musk ox (*Ovibos moschatus*) in the Thelon Game Sanctuary, Northwest Territories.” 36 (4), 529-532.
- h. WU, L. Y., 1958.—“Morphology of *Ditylenchus destructor* Thorne, 1945 (Nematoda: Tylenchidae), from a pure culture, with special reference to reproductive systems and esophageal glands.” 36 (4), 569-576.
- i. MAHON, J., 1958.—“Helminth parasites of reptiles, birds, and mammals of Egypt. V. Avian cestodes.” 36 (4), 577-605.
- j. PREMVATI, 1958.—“Studies on *Strongyloides* of primates. IV. Effect of temperature on the morphology of the free-living stages of *Strongyloides fülleborni*.” 36 (4), 623-628.

(107a) *Monhystera cameroni* n.sp. was found on the appendages, and sometimes in the gut, of *Mysis stenolepsis*, *M. mixta*, *Crago septemspinus*, *Pandulus borealis* and *P. montagui* from the Gulf of St. Lawrence. Although it resembles *Monhystera socialis* Bütschli nec Chitwood the amphids are more posterior, the oesophagus does not have the posterior cells described by Bütschli and the tail, which contains only two prominent foot gland cells, has a ventral copulatory hump in the male. The term foot gland is considered more desirable



than caudal gland for these haptic structures, found in many aphasmidian nematodes. The specimens identified as *M. socialis* by Chitwood are now named *M. chitwoodi* n.sp. This species is differentiated mainly by the more anterior position of the vulva, the presence of four post-cephalic, submedian, setose papillae and the absence of a caudally directed apophysis on the gubernaculum. A sporozoan parasite found in three larvae of *M. cameroni* is illustrated.

M.MCK.

(107b) In this study of speciation in *Cyclops vernalis* seven reproductive isolates were assayed as first intermediaries for *Trienophorus nodulosus* and *T. crassus*. All seven became infected with *T. nodulosus* but three were refractory to *T. crassus*. The same two isolates appeared to be the best hosts for both species.

S.W.

(107c) Ronald has examined 560 specimens of Heterosomata in the Gulf of St. Lawrence area and records the cestodes recovered. *Scolex pleuronectis* occurred in *Hippoglossoides platessoides*, *Hippoglossus hippoglossus* and *Limanda ferruginea* but was fairly rare; this is the first record of its occurrence in halibut in North American waters. Four specimens of a larva of *Phyllobothrium* sp. were found in the pyloric caeca of *L. ferruginea*, and this host species also harboured tetraphyllidean plerocercoids in the intestine. *Diplocotyle olrikii* was found in *Hippoglossoides platessoides*, *L. ferruginea* and *Pseudopleuronectes americanus*. *Clestobothrium crassiceps* was recovered from the pyloric caeca of *Hippoglossus hippoglossus*; this is only the second record of this species in a pleuronectid and may be due to the halibut having eaten an infected hake. *Bothriocephalus scorpii* occurred in *Limanda ferruginea*, *Liopsetta putnami* and *Scophthalmus aquosus*, and *B. claviceps* in *Pseudopleuronectes americanus*. The distribution of the parasites is shown on a map.

S.W.

(107d) Webster describes infections which indicate that intrauterine infections of *Toxocara canis* occur as a result of the reactivation of larvae in the somatic tissues of the bitch during gestation. She searched for larvae in experimentally infected dogs, some of which had been given several doses of ova of *T. canis*, and found that tracheal migration predominates in dogs under three months of age and somatic in those over six months old. More larvae were recovered from the muscles of bitches than of males. Two pregnant bitches, the faeces of which were negative during the month preceding parturition, produced infected litters and were found to be passing ova three weeks after parturition. Another bitch which had been negative from the age of nine months and had continued negative during pregnancy, gave birth to infected pups and was passing *T. canis* eggs two weeks later. One of these puppies, which remained negative to faecal examination after the age of seven months, and was confined during pregnancy to a special container supplied with filtered air. She too gave birth to infected puppies.

M.MCK.

(107e) In this third paper on the parasites of fishes in the South Pacific Ocean, Laird describes an encysted metacercaria of *Stephanostomum* sp., which was recovered from the gills of *Ambassis miops*, an undetermined species of *Microcotyle* from the gills of *Mugil oligolepis* and a new dactylogyrid species, *Daitreosoma parva* n.sp., from the gills of *A. miops*. Laird points out that in Sproston's key the statement that *Daitreosoma* has two pairs of "head organs" is an error as in her generic diagnosis she states that three pairs occur. According to Johnston & Tiegs there are three pairs in *D. constrictum* but they illustrate four pairs in *D. bancrofti*. In the new species two pairs could be distinguished with certainty but more may be present. *D. parva* is distinguished from *D. bancrofti* and *D. constrictum* by its small size, by the position of the testis which lies ventrally to the ovary and by details of the haptorial structures.

S.W.

(107f) The mating and egg-laying habits of free-living *Strongyloides fülleborni* were observed in three culture media: cow faeces and charcoal, tap water with a small quantity of cow faeces, and nutrient agar. Even under optimum conditions the eggs of the parasitic females gave rise invariably to free-living adults. Their eggs, in turn, produced only pre-infective larvae, indicating that there is only one free-living generation. The free-living adults

copulated repeatedly, starting after about 30 hours' incubation, and the females laid a batch of eggs after each mating, passing a total of up to 180. Mature females separated from the males laid only two batches of fertilized eggs and did not void more than 40 to 60 embryonated eggs altogether. Unfertilized females maintained without males laid only non-viable eggs. M.MCK.

(107g) Gibbs & Tener record *Dictyocaulus viviparus*, *Nematodirella longispiculata*, *Ostertagia circumcincta*, *Moniezia expansa*, *Cysticercus tenuicollis* and a sterile multilocular cyst of *Echinococcus granulosus* from *Ovibos moschatus* in the wild state. This is the first record of *N. longispiculata* and *E. granulosus* cysts in this host and of *D. viviparus* in this host in the wild state. A check list of the helminths so far recorded in musk oxen is given. S.W.

(107h) Wu gives a very detailed description of the morphology of *Ditylenchus destructor* Thorne, 1945. She studied living and dissected specimens. There are a pair of minute "guard cells" at the junction of the oesophageal lumen and intestine. The female reproductive system she differentiates into: ovary with oocytes in two rows, oviduct composed of two rows of cells, uterus subdivided into seminal receptacle at the distal end, quadricolumella as the region of four rows of four cells each which may be secretory in function, uterus proper which accommodates eggs and which opens through the vagina to the vulva, and post-uterine pouch which varies in size and shape with age. The male system has four regions, viz., testis with cells in two rows, vas deferens in which the spermatocytes undergo division, seminal vesicle where the sperms are stored, and spicules. J.B.G.

(107i) Mahon records 29 species of cestodes from birds in Egypt, including two new species. *Raillietina* (*Fuhrmannetta*) *malakartis* n.sp., from *Coturnix* sp., is most closely related to *R. (F.) pseudoechinobothrida* but differs from it in having fewer rostellar hooks, fewer testes and a larger number of eggs per capsule. *Neyraia parva* n.sp., from *Upupa epops*, is distinguished from *Neyraia intricata* from the same host by the shape and number and size of the rostellar hooks, which are sufficiently different to justify the creation of a new species although the anatomy of the new form is at present unknown. The anatomy of the other species identified is discussed and the measurements of a number of them are tabulated. There are a number of new host records. S.W.

(107j) Premvati found that the size of both free-living females and infective larvae of *Strongyloides fülleborni* varied with temperature. It was maximal in the case of the adult at 25°C. and in the case of the larva between 25° and 30°C. The number of eggs in the uterus of the free-living female also varies with temperature and is also maximal (35 eggs) at 25°C. The morphology of the oesophagus and, more particularly, of the vulva differs in females developing at different temperatures. Those developing at 25° to 30°C. show all the features characteristic of the free-living females of *S. fülleborni*; those developing at 20°C. and 35°C. resemble the free-living females described for *S. cebus*; while those developing at 15°C. resemble perfectly the descriptions of *S. simiae*. J.M.W.

#### 108—Chinese Medical Journal. Peking.

- a. CHING, W. H., 1958.—"Acute schistosomiasis. Clinical manifestations of 96 cases." **76** (1), 1-10.
- b. LIU, J., HSÜ, C. Y., LIU, Y. K. & CHENG, W. J., 1958.—"Therapeutic effect of antimony potassium tartrate in the treatment of schistosomiasis." **76** (1), 11-23.
- c. CHIANG, S. T. & CHANG, K. C., 1958.—"Schistosomiasis japonica: radiological pulmonary manifestations in 47 cases." **76** (1), 24-39.
- d. DAO, C., T'ANG, Y., CH'I, W. L., SHEN, T. J. & TS'AI, Y. H., 1958.—"Acute schistosomiasis: clinicopathologic report of three cases." **76** (1), 40-46.
- e. HUANG, M. H. ET AL., 1958.—"Mechanism and treatment of cardiac arrhythmias in tartar emetic intoxication: with special reference to atropine therapy." **76** (2), 103-115.
- f. LIU, J., HSÜ, C. Y., HSÜ, P. Y. & TAI, T. Y., 1958.—"Pulmonary manifestations of acute schistosomiasis japonica." **76** (2), 144-151.
- g. LIU, J. ET AL., 1958.—"Acute schistosomiasis japonica." **76** (3), 229-242.
- h. SU, T. F. & CH'EN, N. P., 1958.—"Schistosomiasis in children." **76** (4), 361-375.



- i. TAI, T. Y., HSÜ, C. Y., CHANG, H. C. & LIU, Y. K., 1958.—“Typhoid and paratyphoid fevers occurring in cases of schistosomiasis.” **76** (5), 426-435.
- j. LIN, L. C. & CH'EN, K. K., 1958.—“Certain epidemiologic features of filariasis in Foochow.” **76** (5), 490-496.
- k. WEI, P. H. & KUO, N. K., 1958.—“Intradermal reaction in ancylostomiasis.” **76** (6), 556-560.

(108a) From the Anti-schistosomiasis Research Institute, Kaoyu, Ching reports on 96 cases of acute schistosomiasis seen in 1955. All lived in Kiangsu province. 47 males and 49 females were affected, the majority in the 11-20 age group. 84 were primary infections. Onset was generally acute and cercarial dermatitis occurred in most cases immediately after exposure. Liver enlargement was frequent; eosinophilia occurred in all and leucocytosis (more than 10,000 per cu. mm.) in 61. Treatment was by tartar emetic 25 mg. per kg. body-weight as 1% saline solution for 25 days, intravenously except for those in poor condition when it was longer. Dizziness after the injection occurred in 12.5%. Egg hatching was negative in all cases by the twenty-fourth injection but follow-up two months later showed 34 positive cases (45.3%). W.K.D.

(108b) In the three years 1952-55, 1,656 patients with schistosomiasis were given antimony treatment at the Department of Medicine, First Medical College, Shanghai and 471 who had received the complete course were followed up. The total dosage varied from 20-25 mg. per kg. body-weight divided into 20 doses given as 1% saline solution intravenously. The diagnosis was confirmed by egg hatching tests. No acute cases were included. Of 29 of the male patients over 16 years old who before treatment had infantile genitals 13 reached puberty after. Four patients were dwarfs due to the disease. No change in the sizes of liver or spleen were found in 40% to 50% of cases after treatment. There was a greater relapse rate in the severe cases. The authors consider that severity of infection is the decisive factor and though antimony tartrate is very good, its effects are proportional to the dosage. Relapses occur less often with the larger doses but are more frequent in children. The most serious drug reaction was Stokes-Adams syndrome. Patients should be followed up for at least one year before criteria of cure can be assessed. The importance of early treatment to avoid liver damage is stressed. W.K.D.

(108c) As the result of floods in 1954 in the Wuhan area many persons became infected with schistosomiasis japonica through great extension of the previously infested area. The authors examined 1,100 by fluoroscopy, and 164 by radiography. Positive lung changes were found in 53, and the findings in 47 are reported. There was diffuse infiltration with a variable morphology, mostly mottling with small patches of infiltration and increased lung markings. The lung changes occurred after the clinical manifestations and resolution of the shadows took from 8-52 days. The lung changes usually appear in the early stages but the authors are not certain whether they are due to deposition of ova or caused by the passage of cercariae. W.K.D.

(108d) An account is given of the findings on necropsy in three cases of acute schistosomiasis, one female and two males. All had bathed in infested water on the outskirts of Shanghai, and their stools were positive for *Schistosoma japonicum*. The principal findings were “pseudo-tubercles” in and on the liver and intestine and numerous small nodules on the lung surfaces in which one or more ova were usually seen. In one patient very large numbers of ova were found in the gastric mucosa unaccompanied by marked tissue reaction, and a massive infection of the liver, intestine, lungs, kidneys, adrenals and spleen. One patient also had had typhoid which had been treated by chloramphenicol. (Blood culture in this case was positive for *S. typhi*.) On post-mortem examination no evidence of typhoid was found. No evidence of schistosomiasis was found in the brains. W.K.D.

(108e) The authors from Shanghai point out that the therapeutic dose of tartar emetic is so close to the toxic dose that this is a great disadvantage, and mention that of 51 cases with severe antimony intoxication 50 had cardiac arrhythmias and 40 died. Most of the deaths

occurred after repeated Stokes-Adams attacks. The effects of antimony are shown by electrocardiographic tracings; its action may depend on the vagus being intact so that drugs which lessen or abolish the vagal reflex may be valuable. Atropine was used in 11 cases all of whom had Stokes-Adams attacks and of the four who died three had had atropine either hypodermically or by slow intravenous drip. The seven patients who recovered received 0.5-1.5 mg. intravenously every one to four hours and some hypodermic injections as well. No drug reactions were seen and the atropine was definitely useful. Stokes-Adams attacks occur mainly in females and sodium phenobarbitol was given in addition. A suggested schedule of treatment of the severe cardiac arrhythmias met with in antimony treatment is put forward. W.K.D.

(108f) The pulmonary manifestations seen in 50 cases of acute schistosomiasis are reported from Shanghai. All the patients were seen at the First Medical College and all but two were male; the ages ranged from 15 to 60 years, and the majority had a heavy primary infection. No ova were found in the sputum of eight patients who had diffuse miliary lesions, on repeated examination. 47 cases showed bilateral involvement of the lungs on X-ray, the principal lesion being scattered miliary or granular infiltration of both lungs. At the peak of development, usually one to two months after the onset of fever, there was extensive soft hazy mottling of both lung fields and though these changes usually absorbed in about two months, some increase in lung marking remained. No calcification was seen. The authors consider that in man the pulmonary changes are not due to cercariae but to the deposition of ova, as if they were caused by the former they would occur much earlier. Since adult worms have never been found in the lungs the appearances must be due to emboli from the portal circulation. Unless X-rays are taken as a routine the changes can easily be overlooked. W.K.D.

(108g) From the First and Second Medical Colleges at Shanghai comes an analysis of 200 cases of acute apparently primary schistosomiasis found in Shanghai hospitals from 1942 to 1955, the greater number being seen in 1955. All but four were male. In 23 with a history of a single exposure the incubation period varied from 17 to 62 days. Fever even more than 40°C. was the main symptom, then diminished appetite, chills, sweating, cough, with enlargement of liver and spleen and emaciation. Chest X-rays of 67 patients showed bilateral miliary lesions in 32 but no ova were found in the sputum. Eosinophilia was found in practically all, and leucocytosis in most; the eosinophilia did not run parallel to the severity of the infection. Liver function tests showed considerable impairment. 67 out of 85 showed changes on sigmoidoscopy, but cerebral lesions were found in only two cases. The mortality rate was 4% and the relapse rate after antimony treatment surprisingly high. The protean nature of the disease is emphasized, but in the acute form the liver always shows some signs of damage; some degree of immunity seems to be acquired by repeated infections. The authors consider that acute schistosomiasis is quite a new problem. [The last sentence is significant as the abstractor knew the area very well 25 years ago, and can only remember very few cases in which ova of *S. japonicum* were found in many thousands of stool examinations.] W.K.D.

(108h) A report is given of the examination of 454 children under 12 years old admitted to Shanghai hospitals for schistosomiasis from June, 1949 to December, 1955. The majority were boys aged 7 to 12, and most of the patients came from the countryside and small towns near Shanghai. The main clinical manifestations were fever and cough and in several instances miliary lesions were found in the lungs on X-ray. In the acute stage the disease may be mistaken for tuberculosis, malaria or enteric fever but especially tuberculosis; in the chronic stage diagnosis is not difficult with a history of long continued low-grade fever, and marked dysenteric-like diarrhoea. Here nearly half the cases had retarded growth. Other helminth ova—*Ascaris*, *Ancylostoma* and *Fasciolopsis*—were found in many cases. Liver functions were disturbed in more than one-third of the cases. 335 patients were given tartar emetic, 21 foudadin



and 24 had no antimony treatment. Tartar emetic was given usually as 1% solution intravenously on the basis of 20–35 mg. per kg. body-weight, the length of the course varying from 16 to 111 days. Drug reactions increased when the amount given was more than 16–20 mg. per kg.; reactions also occurred with foudadin. Only three cases died. On follow-up the incidence of negative stool hatching was directly proportional to the dosage. In 49 cases complicated by enteric fever, malaria, amoebic dysentery, or pulmonary tuberculosis the complications were treated first and specific therapy started as soon as possible after. The authors point out that reports on patients under 10 years are rare. The clinical features in children resemble those of adults except that the pulse is more rapid and unstable and in acute infections the eosinophils are much lower percentage than in adults. Tartar emetic 1% solution in a total dosage of 26–30 mg. per kg. body-weight in doses of 3–5 ml. daily was found to be the best while atropine was very useful to combat drug reactions. The vital importance of prevention is emphasized.

W.K.D.

(108i) The authors report 62 cases of combined enteric fever and schistosomiasis. The enteric cases included infections due to *S. typhi*, paratyphoid A, paratyphoid B, and paratyphoid C. 49 were proved bacteriologically, and 13 serologically, while the schistosomiasis was proved by egg hatching except for two necropsies. The onset was sudden in two-thirds of the cases with remittent fever, diarrhoea, and enlargement of the liver and spleen. Half the cases had a leucopenia and nearly all a marked reduction in eosinophils; these increased as the patients improved. 47 cases were treated with chloramphenicol, one with synthomycin, and 14 received no antibiotics. Relapses occurred in 22 cases treated by chloramphenicol. The disease lasted for an average of 53 days in the antibiotic group, but cases with marked splenomegaly took longer. The reduced efficacy of chloramphenicol is attributed to damage to the reticulo-endothelial system caused by the schistosomes. Tartar emetic treatment may be started if the condition of the patient warrants it, but should be commenced with smaller doses and the course should be prolonged.

W.K.D.

(108j) Persons in and around the city of Foochow were examined to see if the opinion that fluorosis may influence filariasis is correct. Persons from the densely populated city area, the less densely populated rural area, and a sparsely populated mountainous area in the Min River basin were examined for teeth mottling and microfilariae. The filaria is *Wuchereria bancrofti* and the vector *Culex fatigans*. Water samples from the areas were tested for fluorine. The results showed *W. bancrofti* present in 8.5% of the 9,045 persons examined, the greatest intensity being in the city due to the abundant breeding ground, while out of 1,320 persons 505 had mottled teeth. The authors consider that although fluorosis is a serious condition in Foochow it does not appear to have any effect on the filariasis.

W.K.D.

(108k) At the Paoting Medical College, Hopei Province, the authors tried three antigens made from *Ancylostoma duodenale* in intradermal tests. These were as follows: antigen A, made by trypsin digestion from freshly passed worms; antigens B and C made by the usual cold extraction method, the former with freshly expelled worms, and the latter from worms preserved in 70% alcohol. All were preserved with 1:10,000 merthiolate. Wheals were raised on the volar surface of the forearm within a ring 0.45 cm. diameter. Wheals greater than 0.75 cm. diameter with erythema were considered positive, readings being taken 15 minutes after injection. Positive results were obtained with antigen A in 58 out of 61 cases, with antigen B in 52 out of 55 cases and with antigen C in 21 out of 24 cases. Cross reactions with other helminth infections only occurred in three out of 54 patients with antigen B, and here the higher the dilution the weaker the positive reaction; hence dilutions of 1:200 were found best. The authors consider that on the whole antigen B gave the best results and was much easier to prepare than antigen A. They suggest that although not 100% specific, if used intradermally it may be of value in hookworm surveys.

W.K.D.

**109—Comptes Rendus des Séances de la Société de Biologie. Paris.**

- a. ROMAN, E., 1958.—“Possibilité d'infestation par *Hymenolepis nana fraterna* des rongeurs adultes traités par la cortisone.” **152** (1), 105–107.
- b. CHABAUD, A. G. & MAHON, J., 1958.—“Cycle évolutif du nématode *Spirura talpae* (Gmelin 1790).” **152** (3), 474–476.

(109a) Roman treated four white rats and two white mice, aged at least five months, with cortisone acetate (10–25 mg. per kg. body-weight) daily for a week before feeding to them eggs of *Hymenolepis nana fraterna* and until they were killed 14 to 16 days later. All became infected. One rat given 75 mg. per kg. did not become infected. S.W.

(109b) Chabaud & Mahon verified experimentally the suggestion of von Linstow (1887) that the intermediate host of *Spirura talpae* is a melolonthiform larva. Seven larvae of this type (in all probability *Cetonia aurata*, although at this stage of development it was impossible to say more than that they belonged to one of the three genera *Cetonia*, *Tropinota* or *Oxythyrea*) were experimentally infected with embryonated eggs of *S. talpae* obtained from adult females found in a dead mole. Examination of these larvae at stated intervals revealed that development had reached the third larval stage by the 37th day, but instead of then passing into a condition of diapause, the larvae continued to grow, reaching a length of over 5 mm. by the eighth month. *S. talpae* thus has a life-cycle intermediate between that of typical spiruroids, with its marked diapause, and that of *S. rhytipleurites* var. *seurati*, in which development to the sexual stage is continuous. Experimental infection of the true definitive host, *Talpa europaea*, with the third-stage larvae was unfortunately not possible; and experimental infection of a white rat gave negative results. J.M.W.

**110—Cornell Veterinarian.**

- a. WHITLOCK, J. H., 1958.—“The inheritance of resistance to trichostrongylidosis in sheep. I. Demonstration of the validity of the phenomena.” **48** (2), 127–133.
- b. WHITLOCK, J. H. & MADSEN, H., 1958.—“The inheritance of resistance to trichostrongylidosis in sheep. II. Observations on the genetic mechanism in trichostrongylidosis.” **48** (2), 134–145.
- c. MADSEN, H. & WHITLOCK, J. H., 1958.—“The inheritance of resistance to trichostrongylidosis in sheep. III. Preliminary studies using a gastric pouch.” **48** (2), 145–164.

(110a, b, c) These three papers are really consecutive and give a rather discursive account of further comparative experiments relating to the transmission of some genetic factor inducing resistance to *Haemonchus* infections in sheep. Resistance was measured by plotting haematocrit readings against the square root of 0.02 of the highest egg count per gramme of faeces. Some of the tests were in ewes and lambs naturally infected on pasture, others involved artificial infections. In the third paper observations were made on sheep in which gastric pouches had been made and artificially infected. The genetic factor was transmitted through a ram rejoicing in the name of Violet and experiments on nearly 500 sheep confirmed (i) that the inheritance in its progeny of a factor (Vf), which seemed to act as a simple dominant, induced resistance to trichostrongylid infections; and (ii) that it was possible to breed genetically resistant and susceptible strains. As regards the latter the resistance of Violet's female progeny was tested by breeding them again to it two years later. No evidence of increased resistance was found and even Violet  $\times$  other ewes which were also relatively resistant did not increase this. Thus the Vf factor cannot be intensified by either in- or cross-breeding and is liable to considerable variations which may be due to variations in the infecting doses of larvae. In general however, Violet's progeny had higher haematocrit and lower egg counts than the controls. As lambs naturally resistant under pasture conditions can have their resistance broken down by superinfection with *Haemonchus*, part of this resistance may be associated with the ewe through the milk, since the ewe may influence this hereditary factor irrespective of the ram matings. Extending these studies, Madsen & Whitlock made abomasal pouches in a number of susceptible sheep and recorded the reaction of the animals to infection with adult *Haemonchus contortus*, and to sheathed, and exsheathed larvae. Doses varied from upwards of 20 adult worms and several



hundred larvae. Experiments were also performed with infective *Haemonchus* and *Ostertagia* larvae after treatment with 1 : 40 chlorox to ensure exsheathment. Taxonomically there was doubt as to the specific identity of the *Haemonchus* used since the *H. contortus* used differed in several significant particulars from those described by Roberts *et al.* in Australia; and aberrant forms were also recovered. Miscellaneous experiments were also carried out on (i) precipitin formation, which were entirely negative; and (ii) exsheathment, which resulted in the finding of some exsheathed larvae in the pouches even with pH less than 5.0. There was absolute correspondence between the resistance on pasture and pouch infections. The authors conclude that (i) it is possible to raise *H. contortus* and *O. circumcincta* to maturity in gastric pouches; (ii) the pouch method offers an excellent method of studying the influence of host ecology on the development of specific characters in the parasites; (iii) the anthelmintic factor Vf was probably contained in the gastric mucosa and its immediate vicinity; (iv) an age factor is also probably involved. W.K.D.

### 111—Deutsche Tierärztliche Wochenschrift.

- a. EHRLICH, I., LUI, A. & WINTERHALTER, M., 1958.—“Über die fasciolocide und ovide Wirkung des Tetrachlorkohlenstoffs (CCl<sub>4</sub>) bei Schafen.” 65 (12), 323–326. [English summary p. 326.]

(111a) Ehrlich *et al.*, working in Yugoslavia, report that 18 out of 20 sheep treated subcutaneously with carbon tetrachloride (5 c.c. of a 3 : 1 mixture with paraffin) were completely cured of *Fasciola hepatica* infection. In the remaining two animals the degree of infection was greatly reduced. The percentage of viable ova recovered from the bile-ducts of ten treated sheep varied between 2.06 and 5.68; viability of ova from the gall-bladder was from 5% to 58.1%. Carbon tetrachloride had no effect on *Dicrocoelium dendriticum* or hydatid. A.E.F.

### 112—Dissertation Abstracts.

- a. MILLER, G. C., 1958.—“Digenetic trematodes in Louisiana fresh-water fishes.” 18 (2), 702.

(112a) In the abstract of his thesis, Miller states that 19 species of digenetic trematodes (representing 11 families and 17 genera) were collected during the years 1954–57 from 629 fresh-water fish (14 families, 21 genera and 31 species) in Louisiana. These are listed as follows: *Phyllodistomum lacustri*, *P. parvulum* n.sp. [no description], *Allocreadium ictaluri*, *Homalometron armatum*, *Crepidostomum cornutum*, *Macroderoides typicus*, *Glossidium corti* n. comb. [original name not given], *Cryptogonimus chili*, *Caecicola parvulus*, *Neochasmus labeosus*, *Allacantho-chasmus varius*, *A. artus*, *Holostephanus ictaluri* (?), *Diplostomulum* sp., *Neascus* sp., *Clinostomum marginatum*, *Pisciamphistoma stunkardi*, *Halipegus perplexus* and an aspidogastriid, *Cotylogaster occidentalis*. All are new records for Louisiana except *Crepidostomum cornutum*, *Neochasmus labeosus* and *Cotylogaster occidentalis*. The biology and ecology of these forms were also studied. S.W.

### 113—Dokladi Akademii Nauk SSSR.

- a. MITSKEVICH, V. Y., 1958.—[On the interpretation of the developmental cycle of the nematode *Elaphostrongylus rangiferi* n.sp. from a reindeer.] 119 (3), 621–624. [In Russian.]  
b. MAKAROV, P. V., 1958.—[The distribution of polysaccharides in the course of gametogenesis, fertilization and egg cleavage in *Parascaris equorum*.] 120 (2), 412–414. [In Russian.]

(113a) From 20% to 61% of reindeer on stag breeding farms in the North were passing larvae of *Elaphostrongylus* type which could survive free for up to two years. Their further development, which involved two moults, occurred by preference in terrestrial snails, e.g. *Trichida hispida* and *Succinea putris* or in species of the fresh-water *Galba* and *Lymnaea*, and lasted 27 to 30 days. The resulting third-stage larvae were given orally to reindeer aged two to five months, all of which passed larvae three to four months later, while on autopsy of one, nematodes 50 mm. long were found in the brain. These worms are named *E. rangiferi* n.sp.

and differ from the two known species *E. cervi* and *E. panticola* by the smaller shuttle-shaped gubernaculum (which measures 0.063 mm.) and the very well developed bursal rays, there being an additional equally long branch on the externo-dorsal ray and a smaller one on one of the branches of the dorsal ray.

G.I.P.

(113b) Polysaccharides first appeared in the young oocytes of *Parascaris equorum* when these reached the prismatic shape, the amount increasing with the growth of the cells, but were absent from all stages in the development of the spermatids. On fertilization the polysaccharide content decreased, reappeared again after the second maturation division, remained constant in early prophase and reached maximum during metaphase, when the stain in the cytoplasm deepened but any accumulation in the spindle and centrosome was absent. The distribution of polysaccharides within the cells is described.

G.I.P.

#### 114—Experimental Parasitology. New York.

- a. PHIFER, K., 1958.—“Aldolase in the larval form of *Taenia crassiceps*.” **7** (3), 269–275.
- b. TINER, J. D., 1958.—“A preliminary *in vitro* test for anthelmintic activity.” **7** (3), 292–305.
- c. DISSANAIKE, A. S., 1958.—“Experimental infection of tapeworms and oribatid mites with *Nosema helminthorum*.” **7** (3), 306–318.
- d. COSTELLO, L. C. & GROLLMAN, S., 1958.—“Oxygen requirements of *Strongyloides papillosus* infective larvae.” **7** (3), 319–327.
- e. ROTHMAN, A. H., 1958.—“Role of bile salts in the biology of tapeworms. I. Effects on the metabolism of *Hymenolepis diminuta* and *Oochoristica symmetrica*.” **7** (3), 328–337.
- f. HALEY, A. J., 1958.—“Sex difference in the resistance of hamsters to infection with the rat nematode, *Nippostrongylus muris*.” **7** (3), 338–348.
- g. HOPKINS, C. A. & HUTCHISON, W. M., 1958.—“Studies on cestode metabolism. IV. The nitrogen fraction in the large cat tapeworm, *Hydatigera* (*Taenia*) *taeniaeformis*.” **7** (3), 349–365.
- h. MARSH, C. L. & KELLEY, G. W., 1958.—“Studies in helminth enzymology. I. Inorganic pyrophosphatase activity in some helminth parasites of domestic animals.” **7** (3), 366–373.
- i. HEYNEMAN, D., 1958.—“Effect of temperature on rate of development and viability of the cestode *Hymenolepis nana* in its intermediate host.” **7** (3), 374–382.
- j. SCOTT, J. A. MACDONALD, E. M. & OLSON, L. J., 1958.—“Susceptibility and acquired immunity of two subspecies of cotton rats to their respective strains of filarial worm parasites.” **7** (4), 418–427.
- k. NORTHAM, J. I. & ROCHA, U. F., 1958.—“On the statistical analysis of worm counts in chickens.” **7** (4), 428–438.

(114a) Phifer presents data which indicate that the aldolase in homogenates of larvae of *Taenia crassiceps* resembles the mammalian enzyme more closely than it does that in Protozoa. The cestode aldolase is not activated by metal ions, the Michaelis constant is  $6.1 \times 10^{-3} \text{M}$  and the optimum pH for aldolase activity is from 8.5 to 9.0; it is soluble, contains no functional sulphydryl groups and remains stable in potassium chloride solution for as long as 90 days at  $-20^{\circ}\text{C}$ .

S.W.

(114b) Tiner describes an *in vitro* micro-technique for the preliminary anthelmintic screening of chemical substances that is considered to meet some of the requirements of an ideal method capable of recognition of inhibitors of single vital enzymes. The method described uses less than 10 mg. of each substance and permits the examination of about 100 samples per month by one operator. The tests are carried out against developing nematode larvae. The necessary nematode growth factors are provided by vacuum-dried *Escherichia coli* cells. For the test, the substance to be examined is dissolved in a volatile solvent, the solution added to the *E. coli* cells and then evaporated. An inoculum of nematode larvae is then added to the *E. coli* cells with their deposited chemical substance. In the experiments described with trichostrongyle larvae, phenothiazine was used as the standard of reference. In tests starting with trichostrongyle larvae hatching from eggs the minimum concentration of phenothiazine that prevented development was 10  $\mu\text{gm}$ . per ml., whereas that inhibiting development of early embryos was 1.0  $\mu\text{gm}$ . per ml. Initial test concentrations of substances were made at 10 and 100  $\mu\text{gm}$ . per ml. Any that were effective at both concentrations were further examined at 1.0 and 0.1  $\mu\text{gm}$ . per ml. None of the substances so far tested had equalled or exceeded the *in vitro* activity of phenothiazine.

O.D.S.



(114c) Dissanaïke has successfully infected *Hymenolepis nana*, in rats and mice, with *Nosema helminthorum* by feeding to them infected segments of *Moniezia expansa* and by introducing a spore-laden suspension into the drinking water. In *H. nana* although all stages of development of *N. helminthorum* were observed the life-cycle appeared to be slightly shorter and the spores were smaller. Two patients with *Taenia saginata* were given concentrated suspensions of spores in gelatin capsules and early developmental stages were seen in one specimen of *T. saginata*. *T. hydatigena* in a dog and *Hymenolepis* sp. and *Anomotaenia* sp. in jackdaws did not become infected. A number of different oribatid mites were also exposed to infection and spores were observed in the mid-gut and caeca of *Ceratoppia bipilis* and *Xenillus tegeocranus* but these were very much smaller than those developing in *H. nana*. Thus the infectivity of this microsporidian is not confined to cestodes. The possible reasons for its failure to establish itself in some tapeworms are discussed. S.W.

(114d) Costello & Grollman found that if infective larvae of *Strongyloides papillosus* were deprived of oxygen they became immobile after one hour but would become active again if oxygen was then made available. If kept without oxygen for six hours the immobilizing effect was irreversible. The larvae consumed an average of 28.6 microlitres of oxygen per hour per mg. dry weight. Exposure to  $1 \times 10^{-3}$ M hydrocyanic acid completely inhibited respiration almost immediately, killing the larvae, thus showing them to be "cyanide sensitive" according to Moulder's classification. Cytochrome oxidase was present in larval homogenates. A comparison of these results with those reported in other nematode larvae indicates an inverse relationship between  $Q_{O_2}$  and longevity. S.W.

(114e) Rothman has studied the effect of sodium cholate, sodium taurocholate and sodium glycocholate on the anaerobic metabolism of *Hymenolepis diminuta* and *Oochoristica symmetrica*. All three bile salts inhibited fermentation and the inhibition was greater at pH 7.0 than at pH 7.4. The inhibition could be partially reversed by washing the worms in three changes of Ringer's solution before transferring to fresh respirometer flasks without bile salts. Detailed results are tabulated. The inhibitory effects of digitonin and Tween 80 were also studied and the data suggest that the behaviour of these compounds differs from that of the bile salts. No correlation between surface activity and inhibition produced was observed. When bile salts were fed to female rats infected with *H. diminuta* there was no demonstrable effect on the production of eggs by the tapeworms. S.W.

(114f) When 47 male and 48 female hamsters aged two to six months were inoculated with larvae of the rat strain of *Nippostrongylus muris* the worm burdens of the males were 20 to 40 times greater than those of the females, whereas in hamsters of one month of age this difference was reduced to a factor of 1.5 to 2.4. This reduction in the sex difference was the result of the greater worm burdens acquired by younger females as compared with older females. Passage of *N. muris* in hamsters increased its infectivity for this host, particularly for the females, which markedly decreased the magnitude of the sex difference. The worm populations of experimentally infected rats aged one to two months were about the same in both males and females. M.MCK.

(114g) Hopkins & Hutchison report on the changes in total nitrogen composition during the larval and adult phases of *Hydatigera taeniaeformis*. They describe the techniques used in their determinations. The percentage nitrogen composition in larvae of the same age, irrespective of their originating from the same mouse or from different mice, showed little variation in light infections but where more than 100 worms were present the percentage nitrogen was considerably higher during the non-infective period. During early development in the liver of a mouse the nitrogen level falls steadily (from above 6% of the dry weight at 42 days to less than 4.5% at 67 days) and then remains constant at  $4.25\% \pm 0.25$ . This change in the relative rates of metabolism occurs at the time the larva becomes infective. In the adult cestodes a specific pattern of the percentage nitrogen level also exists; it rises rapidly during

the first two days in the cat to  $6.5\% \pm 0.7$  and then remains fairly constant throughout the prepatent period (36 days). Various aspects are discussed including the probability that the variation in nitrogen level is an apparent rather than a real change and results from absolute changes in glycogen content, the causal relationship between nitrogen level and infectivity, the greater variation in nitrogen composition in adults as a reflection of the greater variability of the gut than the liver as an environment, and the value of the nitrogen level as a criterion of normality in *in vitro* development. S.W.

(114h) Marsh & Kelley found that saline extracts of nine species of helminths contained inorganic pyrophosphatase. A partly purified preparation from *Haemonchus contortus* was similar to magnesium-activated pyrophosphatases from other organisms. The value of the Michaelis constant, calculated from a modified Lineweaver-Burk plot, was  $2.0 \times 10^{-7}$  moles<sup>2</sup> per litre. W.P.R.

(114i) Heyneman infected *Tribolium confusum* with *Hymenolepis nana* under standard conditions at room temperature and then divided the beetles into groups which were maintained at temperatures between  $10^{\circ}\text{C}$ . and  $43^{\circ}\text{C}$ . Uninfected beetles were kept at the same temperatures as controls. All the beetles kept at  $43^{\circ}\text{C}$ . died after 48 hours but no development of the cysticercoids had been observed after 24 hours at this temperature. At  $42^{\circ}\text{C}$ . half to two-thirds of the beetles died during the first 48 hours but in those which survived, morphologically normal, fully developed scoleces developed after seven days, whereas only four days was required to reach the same stage at  $37^{\circ}\text{C}$ . to  $40^{\circ}\text{C}$ . There was at the higher temperatures ( $41^{\circ}\text{C}$ . and  $42^{\circ}\text{C}$ .) a complete failure of the tail and two cellular protective layers to develop, and the cysticercoids were not infective. The temperature range of  $30^{\circ}\text{C}$ . to  $32^{\circ}\text{C}$ . appeared to be physiologically optimal but development took place more slowly (five to five-and-a-half days). At lower temperatures the rate of development decreased markedly, varying from 11 days at  $25^{\circ}\text{C}$ . to more than 50 days at  $15^{\circ}\text{C}$ . No development was observed at  $10^{\circ}\text{C}$ . and the beetles died after two months. Various crowding effects are discussed. S.W.

(114j) Scott *et al.* investigated the host-parasite relationship between two subspecies of cotton-rats, *Sigmodon hispidus hispidus* and *S. h. texianus*, and the two strains of *Litomosoides carinii* which they harbour in nature. They found that both subspecies were equally susceptible to primary infections of the two strains of worms. Acquired immunity developed equally well in either subspecies of rat with either strain of worm. The comparability of previous work using different strains is therefore not invalidated; but in future experiments comparisons should be made within strains and not between strains. J.M.W.

(114k) Northam & Rocha show that the distribution of counts of *Ascaridia galli* in experimentally infected chickens may be satisfactorily fitted by the theoretical probability distribution known as the negative binomial law. This is completely described by the expression:  $\text{Variance} = m + \frac{m^2}{k}$  where  $m$  = mean of the distribution (zero cases included), and  $k$  = index of over-dispersion. Applying this conclusion to the results of an experiment previously conducted by one of them [Rocha, U. F., 1955, "Ensaio critico do metodo de Ackert como meio de avaliacao da atividade anti-helmintica da tio-difenilamina (fenotiazina) contra *Ascaridia galli* (Schrunk, 1788) em pintos", Thesis, São Paulo, 29 pp.] they were able to make the following deductions, which were less clearly indicated by any other procedure: (i) phenothiazine had a marked effect against the post-tissue and full adult stages of *A. galli*; (ii) no difference in phenothiazine efficiency was detectable between these two stages; (iii) no delayed effect of phenothiazine against the post-tissue phase could be discerned; (iv) since doses 7 to 14 times as large as the usual maximal doses of phenothiazine were used without completely ridding all chicks of their *A. galli*, this drug may not be practicable when worm eradication is the only object of treatment. [This paper should be consulted in the original for the mathematical procedures involved.] J.M.W.



**115—Farm Research. New York.**

- a. PARKER, K. G., MAI, W. F., BRASE, K. D. & FISHER, E. G., 1958.—“Cherry and other fruit trees damaged by nematodes.” **24** (2), 10.
- b. KIRKPATRICK, J. D. & MAI, W. F., 1958.—“*Pratylenchus penetrans*, serious pest of fruit tree roots.” **24** (2), 11.
- c. EDGERTON, L. J. & PARKER, K. G., 1958.—“Cold hardiness of Montmorency cherry affected by nematode damage.” **24** (2), 12.

(115a) This is a semi-popular account of a serious nematode disease, caused mainly by *Pratylenchus penetrans*, of cherry and apple trees in New York State. Suggested remedies are modified cultural treatments, such as the use of sod-mulches, and *in situ* fumigation with some of the more recently developed nematicides. R.D.W.

(115b) This is a more detailed account of the damage caused by *Pratylenchus penetrans* in cherry and apple tree roots. [See also preceding abstract.] R.D.W.

(115c) Twigs of Montmorency cherry taken from trees which had been grown in nematode-infested soil treated with nematicides showed greater frost resistance than twigs taken from similar trees in untreated infested soil. Field observations on orchard trees substantiated these observations. The authors suggest that this difference is attributable to the failure of the trees to “harden”, owing to weakness caused by nematode damage to the roots. A.M.S.

**116—Illinois Veterinarian.**

- a. LINK, R. P., 1958.—“Quinacrine and drocarbil as teniafuges.” **1** (2), 34–36.
- b. PHILLIPS, T. N. & KOLTVEIT, A., 1958.—“A case of equine diarrhoea associated with heavy parenteral *Strongylus edentatus* infection.” **1** (2), 37–39.
- c. LEVINE, N. D., BEAMER, P. D. & MAKSIĆ, D., 1958.—“Hepatitis due to *Amphimerus pseudofelineus* in a cat.” **1** (2), 47–49.

(116a) Dogs naturally infected with *Taenia pisiformis* or *Dipylidium caninum* were treated with quinacrine alone at a rate of 10 mg. or 20 mg. per lb. body-weight or jointly with 1 mg. or 2 mg. per lb. body-weight of drocarbil (nemural). Nine of the dogs vomited and eight were re-treated after a gastric sedative tablet of benzocaine. Worms, stained deep yellow and very active, were passed by all dogs within ten hours after treatment. Quinacrine completely eliminated *T. pisiformis* from 10 out of 11 dogs treated and *D. caninum* from 10 out of 12 treated. Quinacrine with drocarbil cured all five dogs treated for *T. pisiformis* and all three treated for *D. caninum*, but produced persistent diarrhoea and enteritis which, however, could be controlled by the administration of an astringent. G.I.P.

(116b) Phillips & Koltveit report a case of non-infectious diarrhoea in a Shetland pony due to severe parenteral infection with *Strongylus edentatus*. The cause was determined only on necropsy as faecal examinations had throughout been negative. According to Wetzel & Kersten [for abstract see Helm. Abs., **25**, No. 558b] eggs do not appear in the faeces earlier than 322 days after infection. As no therapeutics are known against the migrating stages of *S. edentatus*, the authors suggest a number of preventive measures. G.I.P.

(116c) [An authors' abstract of this paper appeared in *J. Parasit.*, 1956, **42** (4, Sect. 2), 37. For abstract see Helm. Abs., **25**, No. 105dk.]

**117—Indian Coffee.**

- a. SOMASEKHAR, P., 1958.—“Pests of coffee and their control.” **22** (6), 220–246.

**118—Indian Farming.**

- a. SINGH, A. & BEDI, K. S., 1958.—“Loose smut and earcockle.” **8** (3), 6–7, 9–10.
- b. AHLUWALIA, S. S., 1958.—“Maybe that pork carries a tapeworm.” **8** (8), 10–12.

**119—Indian Journal of Medical Research.**

- a. DAVE, P. J. & DHAGE, K. R., 1958.—“Re-survey and present status of the endemic focus of schistosomiasis.” **46** (4), 546–556.

(119a) Dave & Dhage record the results of a reinvestigation of the endemic focus of schistosomiasis haematobia in Bombay State previously reported upon by Gadgil & Shah [for abstract see *Helm. Abs.*, **24**, No. 383c]. A series of tables shows incidence in relation to age, sex, locality and period of residence. The highest incidence was found in Lower Marathwada where 39.9% of males and 6.1% of females were infected. This locality also showed the highest incidence (31.5%) among newcomers residing there less than five years. All recent cases were children or adolescents. The pre-monsoon and post-monsoon snail fauna of the river was studied and a close relationship between the snail-infested zone and the residential localities was observed. *Ferrissia tenuis* and *Paludomus obesa* were both abundant but correlation between time of occurrence of fresh cases and seasonal variation in abundance of the snails enabled the former species to be circumstantially incriminated. Fantorin treatment gave discouraging results.

J.M.W.

**120—Indian Veterinary Journal.**

- a. SINHA, P. K. & SRIVASTAVA, H. D., 1958.—“Studies on the age resistance and resistance to superinfection of poultry against *Raillietina cesticillus* (Molin), with some observations on the host specificity of the parasite.” **35** (6), 288–291.
- b. ALWAR, V. S. & LALITHA, C. M., 1958.—“Parasites of domestic cats (*Felis catus*) in Madras.” **35** (6), 292–295.
- c. RAGHAVAN, R. S., 1958.—“Nodular cirrhosis of liver in equines.” **35** (8), 387–389.
- d. SHOHO, C., FERDINANDO, F. D. & CUMARASAMY, K., 1958.—“Therapeutic trials involving the effect of 1-diethylcarbamy-4-methyl-piperazine dihydrogen citrate for treatment of eye worm (*Filaria oculi*) of horses. (With a note on setariasis in India).” **35** (9), 443–451.
- e. RAHMAN, M. H., 1958.—“A survey of helminthiasis in East Pakistan.” **35** (10), 539–541.

(120a) A small primary infection with *Raillietina cesticillus* of chicks (two to four, or eight cysticeroids per bird) did not confer immunity against a large superinfection (100 or 200 cysticeroids per bird respectively). The chicks developed age resistance when 11 to 12 weeks old. Experimental infection of the sparrow, dove, pigeon, duck and white rat was unsuccessful showing that *R. cesticillus* is strictly specific in respect of its final host.

G.I.P.

(120b) Alwar & Lalitha have examined 50 cats in Madras and found that all adults but one were infected and that the 18% free of infection were kittens. Of the 16 helminth species found, *Heterophyes heterophyes*, *Dipylidium cati*, *Strongyloides stercoralis*, *Capillaria* sp., *Cylicospirura subaequalis* and *Rictularia cahirensis* are recorded for the first time from cats in Madras. The most frequent species was *Ancylostoma braziliense* (in four cats recovered also from the lungs). The intensities and frequencies of the infections are tabulated and the latter compared with those found by Chandler (1925) for cats in Calcutta.

G.I.P.

(120c) Routine post-mortem examination of 15 ponies revealed the presence of nodular cirrhosis due to schistosomiasis in 12 of the animals. The nodules ranged in size from that of a pinhead to that of a pea. Microscopical examination of liver sections showed schistosome eggs in one nodule only, but the aetiology of the remainder was not in doubt in view of the presence of spaces resembling schistosome eggs in some of the nodules and of the appearance of the lesions, which was in strict conformity with that described for this condition by Dutta (1933).

J.M.W.

(120d) Shoho *et al.* successfully treated two cases of ocular filariasis in horses with caricide (diethylcarbamazine). One or two doses of 80 mg. per kg. body-weight sufficed to cause the disappearance of the worms from the anterior chamber and to clear up the cloudiness of the eye. It was not possible to determine the identity of the worms but they were presumably immature *Setaria digitata*.

J.M.W.



(120e) Helminthiasis are a major factor contributing to the long continuing degeneration of livestock in Pakistan. 350 cattle, 400 goats and 230 poultry investigated showed the following infection rates: (i) cattle—*Neoascaris vitulorum* 25%, *Mecistocirrus digitatus* 20%, *Trichuris* sp. 10%, *Stephanofilaria assamensis* 25%, *Cysticercus tenuicollis* 45%, *Fasciola gigantica* 75%, *Paramphistomum cervi* 60%, *Cotylophoron cotylophorum* 60%; (ii) goats—*Oesophagostomum venulosum* 85%, *O. columbianum* 60%, *Trichuris* sp. 20%, *Moniezia expansa* 90%, *Cysticercus tenuicollis* 58%, *F. gigantica* 25%, *P. cervi* 25%, *Cotylophoron cotylophorum* 30%; (iii) poultry—*Ascaridia galli* 60%, *Heterakis* sp. 30%, *Raillietina tetragona* 90%. Experiments showed that a group of hens infected with *A. galli* and *R. tetragona* laid 25% fewer eggs over a period of a year than a worm-free group. Action to remedy this situation is urged. J.M.W.

## 121—Japanese Journal of Experimental Medicine.

- a. SASA, M., HAYASHI, S., TANAKA, H. & SHIRASAKA, R., 1958.—“Application of test-tube cultivation method on the survey of hookworm and related human nematodes infection.” 28 (3), 129–137.
- b. TANAKA, H., 1958.—“Experimental and epidemiological studies on strongyloidiasis of Amami Oshima Island.” 28 (3), 159–182.

(121a) Sasa *et al.* describe a modification of the method for the cultivation of hookworm larvae originally proposed by Harada & Mori. Strips of filter paper are smeared with faeces and inserted into test-tubes containing a little water. During incubation (at 24°C. to 28°C.) the infective larvae crawl out of the faeces into the water. A special type of microscope—the ancyloscope—was devised by which the bottom of a test-tube could be examined from above by means of mirrors or prisms. Surveys of intestinal parasites in three different population groups showed that this culture technique was not only superior to direct smear and ordinary concentration technique for detecting hookworm, *Trichostrongylus* and *Strongyloides*, but also facilitated differentiation of *Ancylostoma* and *Necator*. Of 28,445 coal-miners examined in Kyushu and Hokkaido Islands, 5,278 were infected with hookworms (predominantly *Ancylostoma*, 1,995 with *Trichostrongylus*, 5,252 with *Ascaris* and 2,823 with *Trichuris*. 224 farmers out of a total of 1,584 examined in Amami-Oshima Island were infected with hookworms, 14 with *Strongyloides*, 357 with *Ascaris* and 338 with *Trichuris*. 895 out of 1,360 farmers examined on Okinawa Island were infected with hookworms, 110 with *Strongyloides*, 141 with *Ascaris* and 27 with *Trichuris*. Mixed infections of the two species of hookworms predominated among the farmers. J.M.W.

(121b) Tanaka found that diagnosis of strongyloidiasis was most satisfactorily achieved by either the test-tube cultivation technique (REF) or by an extraction technique based on that of Baermann. In the latter 3 gm. of faeces was placed in the centre of a wire gauze saucer placed in a petri dish into which water at 50°C. was introduced. After incubation at 36°C. for half an hour rhabditoid larvae emerged into the water in the dish. Differentiation of *Strongyloides stercoralis* larvae from those of *Ancylostoma duodenale*, *Necator americanus* and *Trichostrongylus orientalis* was achieved by incubating the faecal sample at 37°C. for four days, at which temperature the three last named species died. Observations on the life-cycle of *S. strongyloides* and the morphology of the various stages are reported and figured. 2,778 schoolchildren under 14 examined on Amami Oshima Island showed 23 infections with *S. stercoralis* (0.83%), 244 infections with hookworms (8.8%), 981 infections with *Ascaris lumbricoides* (35.3%) and 605 infections with *T. orientalis* (21.8%). The highest incidence of strongyloidiasis was 11.7% at Aminoko village; and rural inhabitants in the south of the island averaged 7.4% incidence. Most cases were mild and chronic. Hookworm infection was more prevalent among older persons. The author successfully infected himself with *S. stercoralis* by applying 300 infective larvae to the skin of the left forearm. He experienced an itching eruption at the site of infection; a three-day cough appearing after six days and reappearing after 25 days; anorexia; abdominal pain; bloody diarrhoea; and tenesmus. Larvae first appeared in the stool on the 27th day. Relief of abdominal symptoms was obtained by administration of 0.3 gm. diethylcarbamazine daily for a week. J.M.W.

**122—Japanese Journal of Medical Science and Biology.**

- a. KOMIYA, Y., SCHAO, Y. L., HSU, K. C., YAO, S. C., SUN, C. C. & HSU, K. C., 1958.—“The molluscicidal effect of sodium pentachlorophenate and calcium arsenite on *Oncomelania hupensis*, a snail host of *Schistosoma japonicum* in China.” **11** (1/2), 15–20.
- b. ITO, J. & WATANABE, K., 1958.—“On the cercaria of *Centrocestus armatus* (Tanabe, 1922) Yamaguti, 1933, especially in its mucoid gland (Heterophyidae, Trematoda).” **11** (1/2), 21–29.

(122a) Komiya *et al.* showed that sodium pentachlorophenate manufactured in China and that manufactured in Japan were equally effective against *Oncomelania hupensis*, killing 100% of the snails after 48 hours at a concentration of 128 p.p.m. Calcium arsenite also produced a 100% kill in 48 hours if applied at the rate of 4,100 p.p.m. when the soil of the habitat was sufficiently wet. The latter compound, being insoluble, may be more useful when adjacent water is used for domestic purposes, farm animals or fish culture. J.M.W.

(122b) Ito & Watanabe describe briefly the cercaria of *Centrocestus armatus*. They then describe in detail the developmental stages of the mucoid glands found in the cercaria while it is still within the redia. The glands were stained by treating the cercaria with a solution containing one part of toluidine blue or thionine in 2,000 parts of 30% alcohol. The gland cells are stained red by this method. P.K.

**123—Journal of the American Veterinary Medical Association.**

- a. BAILEY, R. W., 1958.—“Dirofilariasis in sentry dogs of the Pacific Air Force.” **133** (1), 48–51.
- b. BAILEY, R. W., 1958.—“A comparison study of various arsenical preparations as filaricides of *Dirofilaria immitis*.” **133** (1), 52–55.
- c. FRITTS, D. H., HAWKINS, Jr., W. W. & MARQUARDT, W. C., 1958.—“A comparison of three anthelmintic preparations against nematodes of sheep.” **133** (2), 113–115.
- d. PRIER, J. E. & LEBEAU, R. W., 1958.—“A microfilaria contaminating a monkey kidney cell suspension.” **133** (2), 125–126.
- e. PETRI, L. H., 1958.—“Seasonal fluctuations of gastrointestinal nematodes of imported beef feeder calves in northeast Iowa.” **133** (4), 203–204.
- f. SPERLING, F., 1958.—“Effectiveness and toxicity of sustained action quinacrine hydrochloride in dogs.” **133** (4), 225–227.
- g. BAKER, N. F. & ALLEN, P. H., 1958.—“Report of a field trial on the use of phenothiazine preparations in feedlot cattle.” **133** (5), 265–268.
- h. UNDERDAHL, N. R., 1958.—“The effect of *Ascaris suum* migration on the severity of swine influenza.” **133** (7), 380–383.

(123a) Sentry dogs play an essential role in the security of American bases in the Far East and control programmes have therefore become necessary against *Dirofilaria immitis* in areas where canine dirofilariasis is enzootic. Such programmes have involved identification and treatment of all infected animals with arsenical drugs to kill the adult worms; annual prophylactic treatment of all dogs with both filaricidal and microfilaricidal drugs; and immediate treatment for both microfilariae and adult worms of all locally procured replacements. 0.75 mg. of arsenic per kg. of body-weight, daily for two days, has been found to be an effective dosage level. Therapy involved a small number of deaths (4.9%), but the improved condition of the survivors more than compensated for the loss. J.M.W.

(123b) Bailey treated 80 dogs infected with *Dirofilaria immitis* by intravenous injection of the following four organic arsenic compounds to determine the most effective dosage schedule: oxophenarsine hydrochloride (Mapharsen); arsenamide (as caparsolate); arsenamide (as filicide); and dichlorophenarsine hydrochloride (filarsen). All four drugs were administered at the rate of 0.75 mg. of arsenic per kg. of body-weight daily, but half the dogs were treated for two days and the other half for three days. No significant difference was apparent between either of the two dosage schedules or any of the four drugs, all being effective in destroying over 95% of the adult worms. Toxic side effects were insignificant. J.M.W.

(123c) Forty lambs selected at random from a flock infected with gastro-intestinal nematodes were segregated into four groups of ten for treatment with 12.5 gm. phenothiazine



as a drench with an average particle size of  $5\mu$ , with 12.5 gm. of standard phenothiazine as a bolus or 2.5 c.c. of tetrachlorethylene in gelatin capsules. Pretreatment egg counts for *Trichostrongylus* and *Nematodirus* showed that all four groups carried a sufficiently comparable worm burden. The animals were killed four to five days after treatment and comparative worm counts were made from aliquots of total worms recovered from each group. From counts based on total worms recovered, fine particle phenothiazine removed 94%, standard phenothiazine 71% and tetrachlorethylene 31%. Fine particle phenothiazine was highly effective against *Ostertagia circumcincta*, *Haemonchus contortus*, *Trichostrongylus axei*, *T. colubri-formis* and *Nematodirus spathiger*. The greatest discrepancy between fine particle and standard phenothiazine was seen in much reduced efficiency against *O. circumcincta* and some reduction in activity against *T. colubri-formis* and *N. spathiger*. Tetrachlorethylene was as active against *O. circumcincta* as was standard phenothiazine but was inefficient against the other parasites.

O.D.S.

(123d) Prier & LeBeau found large numbers of an unidentified microfilaria morphologically similar to those described as typical of the genus *Dirofilaria* in a suspension of kidney cortex cells obtained from an adult African green monkey (*Cercopithecus aethiops*). It is believed that the parasites were resident in the kidney rather than introduced by contamination from peripheral blood.

J.M.W.

(123e) Eighty Hereford calves imported from South Dakota after weaning and maintained under feedlot conditions showed seasonal fluctuation in gastro-intestinal helminths with maximal egg production in early spring, indicating, in some animals, worm burden sufficient to border on clinical importance. This spring rise is concluded to be due to feedlot reinfection with nematodes of the *Haemonchus-Oesophagostomum* and *Cooperia-Ostertagia-Trichostrongylus* groups, and indicates the strategic time for anthelmintic treatment to prevent worm burdens reaching pathogenic levels. No spring rise was observed in *Nematodirus*, *Trichuris* and *Bunostomum* infections.

J.M.W.

(123f) Quinacrine hydrochloride (mepacrine, atebirin) was given to ten tapeworm-infected dogs either at a single dose of 100 mg. per 3.6 kg. of body-weight or an initial dose of 100 mg. followed by five weekly doses of similar size. Tapeworms, identified as *Taenia* sp. and *Dipylidium* sp., were eliminated from seven of the ten dogs. In one dog a persistent massive infection remained whereas the single worms found in the other two dogs were thought to represent reinfections or regeneration from undetached scoleces. No toxic effects following drug treatment were observed.

O.D.S.

(123g) Of 194 yearling steers randomized into four groups, one group was treated with a carob-flour-phenothiazine compound, a second group was given a phenothiazine liquid preparation, the third drenched with phenothiazine and the fourth left as untreated controls. All dosage was equivalent to 60 gm. of phenothiazine, total. The carob-flour and liquid preparations were spread on or mixed with pea silage given as feed for three days. Quantitative egg counts were made from faecal samples from ten steers from each group before treatment. Post-treatment observation showed that after the standard phenothiazine drench the feed-rate remained normal, whilst following the special preparations the feed-rate was considerably reduced and did not return to normal for five days. Pink discoloration of the preputial hairs appeared in all treated animals on the second day of treatment and remained for some days after treatment. Pre-treatment egg counts were low and were not used in estimating comparative drug effect. Worm counts were made on abomasa and small intestines of ten animals from each group  $6\frac{1}{2}$  months after treatment. No significant differences in effectiveness of the three preparations were seen in the small intestines but in the abomasa the carob-flour mixture and phenothiazine gave significant reductions in worm counts. It is concluded that administration of phenothiazine in feed results in gross inequality of dosage and was not an economical practice.

O.D.S.

(123h) Underdahl presents experimental evidence showing that the severity of viral influenza in pigs two to three weeks old is increased by the migration of larval *Ascaris suum*. When experimental animals were inoculated with the virus (Shope S-15) during the migration of *A. suum* larvae through the lungs, severe pneumonia developed and 56% died or were moribund as compared with 4% in control animals infected with virus alone. In the more advanced stages of influenza infections the ascarid migration did not cause high mortality although the duration of severe lung lesions was prolonged. Control measures for ascariasis in swine are therefore important in reducing losses due to the effect of ascarids on comparatively benign pathogenic agents attacking the respiratory tract. J.M.W.

## 124—Journal of Animal Science.

- a. BEMRICK, W. J., EMERICK, R. J., SHUMARD, R. F., POPE, A. L. & PHILLIPS, P. H., 1958.—“The effect of bleeding versus previous infection on the resistance of lambs to subsequent infections of *Haemonchus contortus*.” **17** (2), 363–367.

(124a) Bemrick *et al.* gave a challenge infection of 100,000 third-stage *Haemonchus contortus* larvae to three comparable groups of lambs of which one represented a previously uninfected control, a second had been infected 55 days previously with 20,000 larvae, and the third had been periodically bled by jugular puncture to simulate the average haemoglobin level observed in the infected animals. Three deaths occurred as a result of the challenge infection—two in the control group and one in the bled group. The infected and bled animals had consistently and significantly lower faecal egg counts than the control animals, indicating that previous stomach worm infection and bleeding by jugular puncture permitted the development of similar degrees of resistance to subsequent infection with the same parasite. The authors conclude that one of the most important factors in development of resistance in lambs to infection with *H. contortus* is the haemorrhage produced by the blood-sucking habits of the worms. J.M.W.

## 125—Journal of General Microbiology.

- a. ASCHNER, M. & KOHN, S., 1958.—“The biology of *Harposporium anguillulae*.” **19** (1), 182–189.

(125a) For the first time, a method of growing *Harposporium anguillulae* Lohde, previously considered to be an obligate parasite of nematodes, in pure culture is described. The medium used was a peptone-glucose-yeast extract agar. It has also been demonstrated that the path of infection of nematodes with this fungus is oral, the ingested spores germinating in the oesophagus. Infection experiments with two nematodes with different feeding habits, *Rhabditis* sp., a particulate feeder, and *Dorylaimus* sp., a plant-sucking nematode, showed that only *Rhabditis* became infected with the parasite. Two other unidentified species of *Harposporium* were shown to behave in a similar way. A.M.S.

## 126—Journal of Helminthology.

- a. FOTEDAR, D. N., 1958.—“On a new caryophyllaeid cestode, *Adenoscolex oreini* gen. et sp. nov. from fresh-water fish in Kashmir, and a note on some related genera.” **32** (1/2), 1–16.
- b. YEH, L. S. & FOTEDAR, D. N., 1958.—“A review of the trematode genus *Astiotrema* in the family Plagiorchiidae.” **32** (1/2), 17–32.
- c. DAVIES, J. B., 1958.—“On some trematode parasites from the jackdaw, *Corvus monedula* in Britain.” **32** (1/2), 33–44.
- d. SHELTON, G. C., MAGNER, J. M. & SANTMYER, P. H., 1958.—“Control of the common poultry ascarid by treating the soil with sodium pentachlorophenate.” **32** (1/2), 45–48.
- e. METTRICK, D. F., 1958.—“Helminth parasites of Hertfordshire birds. I. Trematoda.” **32** (1/2), 49–64.
- f. INGLIS, W. G., 1958.—“A redescription of the nematode *Paraspidodera sellsi* Morgan, 1927 and its removal to a new genus, *Morgascaridia*.” **32** (1/2), 65–72.
- g. BUCKLEY, J. J. C., NELSON, G. S. & HEISCH, R. B., 1958.—“On *Wuchereria patci* n.sp. from the lymphatics of cats, dogs and genet cats on Pate Island, Kenya.” **32** (1/2), 73–80.



- h. BUCKLEY, J. J. C. & YEH, L. S., 1958.—“On *Euparadistomum heischii* n.sp. from the liver of a domestic cat on Pate Island, Kenya, and a new sub-family Euparadistominae (Dicrocoeliidae).” **32** (1/2), 81–88.
- i. YEH, L. S., 1958.—“On a new bursate nematode, *Longistriata kenyae* sp.nov. from the house rat, *Rattus rattus kijabius* in Kenya and the erection of a new genus *Longistrioides*.” **32** (1/2) 89–92.
- j. YEH, L. S., 1958.—“A redescription of *Pulmostrongylus herpestis* (S. Khera, 1956) n.comb. from the lung of a mongoose, *Herpestes* sp., from Suva, Fiji.” **32** (1/2), 93–98.
- k. YEH, L. S., 1958.—“A review of the trematode genus *Encyclometra* Baylis and Cannon, 1924.” **32** (1/2), 99–114.

(126a) *Adenoscolex oreini* n.g., n.sp., described and figured from *Oreinus sinuatus* in Kashmir, belongs in the Capingentinae and is similar to *Pseudolytocestus* in that the uterine coils do not extend beyond the cirrus sac and the scolex is unspecialized. However, in the new form the scolex is wider than the body, with its anterior border more or less truncate, the musculature is poorly developed and three prominent columns of glandular tissue extend along three-quarters of the anterior body length. Other distinctive characters are the presence of post-ovarian vitelline follicles and an inverted A-shaped ovary. Fotedar considers a difference in the scolex shape as insufficient for generic diagnosis and makes *Bothrioscolex* a synonym of *Khawia* affecting the new combinations *K. prussicus*, *K. rossittensis* and *K. dubius*.

G.I.P.

(126b) A critical study of ample material of the species of *Astiotrema* leads Yeh & Fotedar to conclude that only four of the 21 species known are valid, the others becoming synonyms, namely: (i) *A. impletum* in which the vitellaria are found in the anterior half of the worm and the oral sucker is twice the diameter of the ventral one while in the other three the suckers are roughly equal; (ii) *A. monticellii* in which the vitellaria are restricted to the second quarter of the worm and the caeca terminate at about the middle of the body; (iii) *A. reniferum* (synonyms *A. elongatum*, *A. loossi*, *A. gangeticus*, *A. spinosa*, *A. indica*, *A. rami*, *A. dassia*, *A. hoshiarpurium*, *A. thapari* and *Gauhatiiana batrachii*, the two genera being synonymous) in which the caeca reach to the posterior body end; and (iv) *A. odhneri* (synonyms *A. orientale*, *A. amydae*, *A. fukuui*, *A. foochowensis*, *A. nathi*, *A. srivastavaei* and *A. mathaii*) in which the caeca terminate by the posterior end of the second testis. *A. emydis* is transferred to *Leptophallus*. The shape of the testes, which may vary from smooth to deeply lobed within the same species, and minor differences in the sucker ratio cannot be used for specific diagnosis

G.I.P.

(126c) Four of 16 jackdaws, collected mainly at St. Albans, Hertfordshire, were found to be infected with trematodes which were identified as *Urotocus tholonetensis* and *Tamerlania zarudnyi*, both new records for Britain, *Platynosomum petiolatum*, *Lyperosomum longicauda* and *Prosthogonimus ovatus*. All except *P. ovatus* are described. The material of *U. tholonetensis* has been referred to this species as it most closely resembles its description; it does however combine some of the characters of this species and of *U. rossittensis* and *U. fusiformis*, suggesting that all three might prove to be variants of the same species.

G.I.P.

(126d) Pens, measuring 7 ft. × 7 ft. and containing litter infected with *Ascaridia lineata*, were sprayed with 2 oz. of sodium pentachlorophenate in 2 gal. of water. Uninfected chicks, which were subsequently placed in the pen for eight days and then killed, showed a worm burden 65% smaller than that of controls from pens which had been sprayed with water. Larger quantities of more dilute solution, allowing a more thorough wetting of litter, may prove even more effective. When similarly tested alkyl polyamine and 2-benzyl-4-chlorophenol did not exhibit any ovicidal activity.

G.I.P.

(126e) During a survey of the helminths of 571 wild birds (belonging to 22 species) in Hertfordshire, the trematodes *Lyperosomum longicauda*, *Lutztrema monenteron*, *Dicrocoelioides petiolatum* and *Brachylaemus fuscatus* were found and are redescribed. A note is made, for each species, of the previously known hosts and of those now recorded which include

the following new hosts: *Turdus viscivorus*, *T. ericetorum*, *T. pilaris*, *Sturnus vulgaris*, *Corvus frugilegus*, *C. monedula* and *Prunella modularis* for *D. petiolatum*; *T. ericetorum* for *B. fuscatus*; *T. pilaris* for *L. monenteron*. New hosts recorded for Britain are *T. merula* and *T. viscivorus* for *B. fuscatus*, and *C. frugilegus* for *Lyperosomum longicauda*.  
G.I.P.

(126f) Inglis redescribes *Paraspidodera sellsi* Morgan, 1927, and shows *P. sellsi* var. *zadi* Vuylsteke, 1956 to be a synonym. *P. sellsi* is made the type of a new genus, *Morgascaridia*, of the family Ascaridiidae which is considered to contain three genera: *Ascaridia*, *Schneiderinema* and *Morgascaridia*. The new genus is distinct in having reduced lips, a club-shaped oesophagus with a series of small teeth posteriorly, equal and identical spicules and a gubernaculum. The systematic position of the family Ascaridiidae is discussed and it is referred to the superfamily Ascaridoidea.  
W.G.I.

(126g) *Wuchereria patei* n.sp., which is recorded from dogs, cats and a genet cat, *Genetta tigrina*, from Pate Island, Kenya and belong to the "*W. malayi*" group of filariae, is characterized by a spatulate tip and cup-like expansion on the proximal end of the left spicule, the absence or inconspicuous nature of the tubercles on the tail of the female, the spicule ratio of 2.25-2.7:1, and by various body measurements. Buckley *et al.* compare in a table the measurements of (i) *W. patei* from the dog, (ii) *W. patei* from the cat, (iii) *W. malayi*? Buckley & Edeson, 1956 from the monkey, (iv) *W. malayi*? Buckley & Edeson, 1956 from the cat and (v) *W. pahangi* from dog and cat.  
M.MCK.

(126h) Buckley & Yeh describe *Euparadistomum heischi*, a new species of dicrocoeliid from the gall-bladder of a domestic cat on Pate Island, Kenya. It is the first species of *Euparadistomum* from a carnivore. *E. heischi* has testes which have the same diameter as that of the ventral sucker. In the other species in the genus, the diameter of the testes is about half that of the ventral sucker. *Euparadistomum* Tubangui, 1931 and *Stromitrema* Skrjabin & Evranova, 1944 are unique in the Dicrocoeliidae in that in all the species of these two genera, the uterus extends forward in front of the acetabulum forming loops on each side which may reach to the oral sucker. On account of the pre-acetabular distribution of the uterus in these two genera, Buckley & Yeh propose a new subfamily *Euparadistominae*, with *Euparadistomum* as type genus. A key is given to separate the three subfamilies of the Dicrocoeliidae.  
L.S.Y.

(126i) Yeh describes a new species of bursate nematode, *Longistriata kenyae*, from the house rat, *Rattus rattus kijabius*, in Mwanza. It has some resemblance to *Longistriata epsilon* and *L. gracilis*. It differs, however, from *L. epsilon* in that the two ventral rays are of equal size, the antero-lateral and medio-lateral rays are much larger than the other rays, and the spicules are almost double the length. It differs from *L. gracilis* in having fewer longitudinal ridges, shorter spicules, the lateral rays of the bursa much larger than the dorsal rays, and a medio-lateral ray which is only slightly less stout than the antero-lateral. In the genus *Longistriata*, *L. codrus* and *L. trus* do not conform to the generic diagnosis, and a new genus *Longistrioides* is erected for their reception with *L. codrus* as genotype. The species of *Longistrioides* are parasites of insectivores and differ from *Longistriata* in having an asymmetrical bursa and a dorsal ray which is longer than the lateral rays. The female tail is blunt.  
L.S.Y.

(126j) Yeh redescribes *Pulmostrongylus herpestis* from the pleural cavity of the mongoose (*Herpestes* sp.) from Suva, Fiji, and upholds that the genus *Pulmostrongylus* Hsu, 1935 is valid and not a synonym of *Aelurostrongylus* Cameron, 1927. The genus *Herpestostrongylus* Khera, 1956 is not recognized and is regarded as a synonym of *Pulmostrongylus*. Hence *H. herpestis* becomes *P. herpestis* n.comb. A key is given to separate the two species in the genus. In an addendum, Yeh believes that the new genus and species, *Acanthoxytnema lucknowensis* Khera, 1956, erected for a worm from the intestine of a goat at Lucknow, is indistinguishable from *Skrjabinema ovis*, and, therefore, proposes the suppression of the genus. He shows that the genus *Papillosclerus* Khera, 1956, which was erected for worms from the lungs of the hedgehog (*Erinaceus* sp.) is synonymous with the metastrongylid, *Metathelazia* Skinner, 1931, and also points out that the worm was wrongly placed in the Filarioidea.  
L.S.Y.



(126k) In a review of the genus *Encyclometra*, Yeh emends the generic diagnosis, and gives a key to the only three species recognized by him, namely, *E. colubrimurorum* (Rud., 1819) known in Europe, *E. asymmetrica* Wallace, 1936 reported from China, and *E. japonica* Yoshida & Ozaki, 1929 from Asia. The last-named species is now reported for the first time from Africa. The species *E. microrchis* Yamaguti, 1933, *E. koreana* Park, 1940, and *E. vitellata* N. K. Gupta, 1954 are all shown to be synonyms of *E. japonica*. The length of the intestinal caeca were found to be a useful character in separating the three species which the author believes to be valid. L.S.Y.

### 127—Journal of Infectious Diseases.

- a. MARKELL, E. K., 1958.—“The effect of cortisone treatment upon the longevity and productivity of *Trichinella spiralis* in the rat.” **102** (2), 158–161.

(127a) Of 60 young Wistar rats each infected with 5,000 larvae of *Trichinella spiralis*, 40 were treated with cortisone by subcutaneous injections at frequent intervals, commencing one day after infection. Samples of controls and cortisone-treated rats were killed eight days after infection and at intervals thereafter up to 14 weeks. Counts of adult worms in the small intestine were made on each sample and larval counts in muscle were made on all rats killed after the third week of infection. Adult worms were absent or present in small numbers in the controls examined from the second to fourth weeks while in the cortisone-treated animals the number of adult worms did not show appreciable reduction during the first eight weeks of treatment and persisted, though in reduced numbers, as long as 14 weeks from infection. Larval counts in muscle showed that the cortisone-treated animals developed 9.7 times as many larvae as did the controls. It is concluded that administration of cortisone prolonged the intestinal phase and that this resulted in a much heavier larval invasion of the muscles. O.D.S.

### 128—Journal of Parasitology.

- a. VOGEL, M. & HEYNEMAN, D., 1958.—“Effect of high temperature on the larval development of *Hymenolepis nana* and *Hymenolepis diminuta* (Cestoda: Cyclophyllidae).” **44** (3), 249–260.
- b. DOUGLAS, L. T., 1958.—“The taxonomy of nematodaeniid cestodes.” **44** (3), 261–273.
- c. HUSSEY, K. L., COURT, W. W. & AMEEL, D. J., 1958.—“The production of cercariae by a strigeid mother sporocyst.” **44** (3), 289–290, 291.
- d. FERGUSON, F. F., COLON, A. Z. DE & ZAYAS, M. V., 1958.—“Potassium hydroxide-centrifugation method for detection of *Schistosoma mansoni* eggs in feces.” **44** (3), 290.
- e. LUND, E. E., 1958.—“Growth and development of *Heterakis gallinae* in turkeys and chickens infected with *Histomonas meleagridis*.” **44** (3), 297–301.
- f. MARTIN, W. E., 1958.—“The life histories of some Hawaiian heterophyid trematodes.” **44** (3), 305–318, 319–323.
- g. MCKEEVER, S., 1958.—“Observations on *Paragonimus kellicotti* Ward from Georgia.” **44** (3), 324–327.
- h. DENCE, W. A., 1958.—“Studies on *Ligula*-infected common shiners (*Notropis cornutus frontalis* Agassiz) in the Adirondacks.” **44** (3), 334–338.
- i. THRELKELD, W. L., 1958.—“The histotropic phase and other biological aspects of *Ostertagia ostertagi*.” **44** (3), 342–343.

(128a) At 30°C. *Hymenolepis diminuta* cysticeroids grown in *Tribolium confusum* show structural variations, but at 40°C. development is abnormal; infective cysticeroids can develop at temperatures from 15°C. to 37°C. Vogel & Heyneman describe the effects of a temperature range of 30°C. to 40°C. for varying times on developing cysticeroids. Most variation occurs in the tail, which becomes progressively smaller and is ultimately lost, the structure of the scolex remaining unaffected. At 37°C. there may be partial or no development of the outer membrane, deformation or absence of tail and inhibition of scolex withdrawal. At 38.5°C. the larvae are abnormal and do not develop. The infectivity of structurally normal cysticeroids grown at 37°C. is lower than at 30°C. At 37°C. development of *H. nana* is usually normal and at 40°C. and 42°C. normal cysticeroids can develop, although the majority are abnormal. High temperature affects mainly the shape and size of the body and the membranes. There is a reduction

of the tail but inhibition of scolex withdrawal is rarely seen. At 39°C. the infectivity is lowered and at temperatures higher than 39.5°C. structurally normal cysticercoids are not infective. The body temperature of mice, in which the larvae normally develop, ranges from 36°C. to 39.6°C., which is too high for *H. diminuta* cysticercoids and only partially suitable for those of *H. nana*, and which may be responsible for abnormalities in development of the latter in the mammalian intermediate host.

J.M.

(128b) Douglas argues that although members of Nematotaeniidae have been at various times referred to Taeniidae, Dilepididae, and Hymenolepididae, the family should retain its independent status as only its members show the following four characters in combination, (i) paruterine organs which develop at the anterior surface of the uterus, (ii) a small, definite number of testes, (iii) a cylindroid form, and (iv) parasitism in either amphibians or reptiles. He reviews the known species of the family, *Nematotaenia dispar*, *N. tarentolae*, *N. lopezneyrae*, *Cylindrotaenia americana*, *C. quadrijugosa*, *Baerietta baeri*, *B. japonica*, *B. jägerskiöldi*, *B. janickii* n. comb. (transferred from *Nematotaenia*) and *Distoichometra bufonis*, and describes *B. diana* from *Batrachoseps attenuatus attenuatus* in California and *D. kozloffii* n.sp. from *Hyla regilla* in Oregon. The new species is phylogenetically intermediate between *Baerietta* and *Distoichometra* but is closer to the latter and very similar to *D. bufonis*, from which it differs however in size and the number of paruterine organs, having six which are paired dorso-ventrally. The diagnosis of *Distoichometra* is emended.

G.I.P.

(128c) Hussey, Cort & Ameel describe and discuss the composition of a single mother sporocyst of *Cotylurus flabelliformis* which contained not only daughter sporocyst embryos and germinal masses but also cercarial embryos and well developed cercariae. Metacercariae were also present. The snail host, *Lymnaea stagnalis appressa*, contained numerous sporocysts of *Diplostomum flexicaudum*.

P.K.

(128d) Approximately one gramme of faecal material is well mixed with 5 ml. of a 5% solution of potassium hydroxide and allowed to stand for one hour before being filtered through gauze and centrifuged at 1,200 r.p.m. The sediment is then microscopically examined for helminth ova. This method has the same general efficiency as the sodium sulphate-Triton-ether centrifugation technique in the detection of schistosome eggs, but is simpler and cheaper.

J.M.W.

(128e) Lund studied the rate of growth of *Heterakis gallinae*, as indicated by increase in the length of the worms, in turkeys and chickens some of which had clinical blackhead. The growth rate of the worms in the two hosts was similar. In diseased caeca worms were absent or fewer than in normal caeca; and those present showed retardation of length, especially in female specimens. *Histomonas* infections which did not provoke macroscopic caecal changes had no effect on worm count or worm length. These facts can be utilized in establishing soil pollution with *Histomonas*-infected eggs of *Heterakis gallinae*.

J.M.W.

(128f) Martin has examined snails collected in ditches around taro patches in Oahu and found *Centrocestus formosanus* and *Haplorchis yokogawai* in *Stenomelania newcombi*, *H. taichui* in *Tarebia granifera* and *Stellantchasmus falcatus* in both the snails. *C. formosanus* and *H. taichui* are new for Hawaii. He has studied the life-histories and gives descriptions and measurements of the various stages. *H. taichui* was established naturally in the second intermediaries *Gambusia affinis*, *Mollienestia formosus*, rarely *Mugil cephalus* and experimentally in *Carassius auratus*, *H. yokogawai* experimentally in *Clarias fuscus*, and *S. falcatus* naturally in *M. cephalus*. The natural final host of the two *Haplorchis* species was *Nycticorax nycticorax*. All three infections were experimentally induced in cats. Martin considers that the smaller size of his *S. falcatus* adults was due either to the age of the worms or to fixation and that the organ generally described in this worm as an acetabulum is a gonotyl. *C. formosanus* metacercariae were found in *G. affinis*, *Xiphophorus helleri* and occasionally in *M. cephalus*, and adults in *N. nycticorax* and rats. Experimentally infection was successful in goldfish, cats, white rats and to a lesser extent in



white mice and chicks. Some of the hosts are new and the sporocyst has not hitherto been described. The elongated sporocysts, some of which were 1 cm. long, were solid when young but older ones had a core of cells in which clusters of nuclei gave rise to the rediae. In the cercaria there were 16 flame cells and the number of circumoral spines in adults varied from 31 to 34. All four trematodes constitute a health hazard in Hawaii. G.I.P.

(128g) Examination of the lungs of 228 mammals from four ecologically similar areas in Georgia, U.S.A. for *Paragonimus kellicotti* revealed infection in 30% of 179 specimens from two of the areas and no infection in specimens from the other two areas. Incidences of infection were: opossum 43%, raccoon 22%, wildcat 17% and striped skunk 15%. Raccoon and striped skunk have not previously been reported as hosts of *P. kellicotti*. No lung flukes were found in cottontail rabbit, grey fox, red fox or domestic cat. Direct statistical correlation was shown to exist between the species of host with the largest average number of flukes and the flukes of largest average size, which may constitute a relative measure of host susceptibility. In order of decreasing relative susceptibility the hosts were: striped skunk, wildcat, opossum, raccoon. J.M.W.

(128h) Larval *Ligula* infected, in Wolf Lake, almost exclusively common shiners and very occasionally cutlips and horned dace, although several species of minnows and suckers were present. The fish carried usually more than one worm and occasionally as many as seven or eight, representing 25% and sometimes up to 50% of the total weight. Few fish of breeding age were infected; in infected fish the gonads were undeveloped and other organs greatly distorted. American mergansers and great blue herons appear to be the most likely final hosts. G.I.P.

(128i) As a result of experimental infection of two calves Threlkeld suggests that the histotrophic phase of *Ostertagia ostertagi* may be similar to that of *O. circumcincta* as shown by Sommerville in 1953 and 1954 [for abstracts see Helm. Abs., 22, No. 42f and 23, No. 10b]. Retardation in the growth of the parasite at various stages of development was noted. Necropsy of 27 beef yearlings revealed numerous young male and female worms at all levels in the abomasal mucosa, while others were in various stages of emergence. Since gravid females are rarely found in the mucosa younger females must escape therefrom in order to copulate. Some of these gravid females oviposit in the gastric pits. J.M.W.

### 129—Madras Veterinary College Annual.

- a. ALWAR, V. S. & LALITHA, C. M., 1958.—“Notes of parasitological interest.” 16, 15–19, 23.
- b. PATNAIK, B., LALITHA, P. S. & VIJAYALAKSHMI, N., 1958.—“Hook worm disease.” 16, 48–58.

(129a) In this record of some of their parasitological findings at the Madras Veterinary College, Alwar & Lalitha report the following helminths: *Paracooperia nodulosa* from buffalo; microfilariae considered to be of *Parafilaria bovicola* from a cutaneous nodule of buffalo and in oozing blood from a bull; a different kind of microfilaria measuring  $276\mu$ – $304\mu$  from the auricular blood of this last bull; and sheathed microfilariae identical with those reported by Ramanujachari & Alwar (in *Indian vet. j.*, 1953, 33, pp. 93–96) in apparently healthy white leghorns. In Madras State, where the incidence of haemorrhagic filariasis in elephants is high, microfilariae of the kind described by Ramanujachari & Alwar in 1954 [for abstract see Helm. Abs., 23, No. 120b] from an elephant in Coorg were recovered from a further 20 elephants and the measurements of these microfilariae are tabulated. M.MCK.

(129b) In this general review of hookworm disease in animals and man, Patnaik *et al.* describe the morphology of *Ancylostoma*, *Necator* and *Uncinaria stenocephala*, the life-cycle of hookworms, the development of disease, the associated blood picture, treatment of the infection and immunity. An outline is given of preventive and control measures against hookworm in domestic pets. M.MCK.

**130—Médecine Tropical.**

- a. COLLOMB, H., PRUVOST, A. & GIRAUD, J., 1958.—“La cysticerose cérébrale. A propos de 11 cas de forme parenchymateuse associée à une généralisation parasitaire.” **18** (2), 228–244.
- b. D'HAUSSY, R., RIT, J. M. & LAGRAULET, J., 1958.—“Contribution à l'étude des lésions du fond d'oeil dans l'onchocercose.” **18** (2), 340–367.

(130a) After reviewing the literature of cerebral cysticerciasis Collomb *et al.* record in detail eleven further cases, nine observed in Marseille and two in Madagascar. There follows a commentary, in the light of these cases, on frequency, diagnosis (neurological and allergic manifestations, extra-cerebral infection, serological tests and biopsy examination) and treatment of this infection. J.M.W.

(130b) D'Haussy *et al.* review the frequency, clinical aspects, histopathology, electroretinogram, general nature and treatment of the posterior eye lesions in ocular onchocerciasis, with particular reference to three new cases, which are described in detail, and to 1,500 other cases observed at Bamako in the French Sudan. J.M.W.

**131—Mededelingen. Directeur van de Tuinbouw. 's-Gravenhage.**

- a. MEIJNEKE, C. A. R. & OOSTENBRINK, M., 1958.—“*Tagetes* ter bestrijding van aaltjes-aantastingen.” **21**, 283–290. [English summary p. 290.]

(131a) It has been found that *Tagetes* reduces the populations of *Pratylenchus*, *Tylenchorhynchus* and *Paratylenchus* species in the soil, also *Rotylenchus robustus*. *Meloidogyne* species are probably also suppressed. No data is as yet available for the genera *Heterodera* and *Ditylenchus*. The possible methods by which *Tagetes* might be used in the control of plant-parasitic nematodes is discussed. It is pointed out that the effect depends on root action of the growing plants and not on decay of haulms and roots in the soil. In some cases, when *Tagetes* has been used as an under crop, unfavourable side effects have been observed in the main crop. Normally, however, better growth of the main crop seems to occur in the year following the cultivation of *Tagetes*. A.M.S.

**132—Medical Journal of Malaya.**

- a. D'ABRERA, V. ST. E., 1958.—“‘Tropical eosinophilia’—some atypical cases of clinical interest.” **12** (3), 559–562.
- b. DANARAJ, T. J., SCHACHER, J. F. & COLLESS, D. H., 1958.—“Filariasis in Singapore.” **12** (4), 605–612.

(132a) D'Abrera reports four atypical cases of tropical eosinophilia from areas in Ceylon hyperendemic for *Wuchereria bancrofti*. The first appeared to be rheumatic heart disease and the second simulated rheumatic fever without cardiac involvement. The third case (which has already been reported) developed filarial thrombophlebitis of a deep vessel on the forearm. These three cases responded to treatment with carbarsone. The fourth case was in a pregnant woman, in whom the disease was in the bronchitic phase, who recovered spontaneously after a change of residence and climate. M.McK.

(132b) Danaraj *et al.* examined blood samples from 902 persons, mainly Chinese and Indian immigrants, in Singapore by means of dehaemoglobinized thick blood films and Knott's concentration technique. They found 50 (5.5%) to be infected with *Wuchereria bancrofti*, but none with *W. malayi*. The results of examining 130 cases of filariasis with reference to clinical signs, degree of eosinophilia and complement fixation reaction are presented in a series of tables. The most frequent manifestations in those with apparent clinical disease were elephantiasis of the legs (48.75%), hydrocele (12.50%) and chyluria (12.50%). Analysis



of residential histories indicated endemic origin of the infection in 30% of Indian and 80% of Chinese and Malay patients. Examination of 1,152 *Culex fatigans* for *W. bancrofti* larvae revealed an over-all infection rate of 1.6%. J.M.W.

### 133—Meditinskaya Parazitologiya i Parazitarnie Bolezni. Moscow.

- a. ISAEV, L. M., 1958.—[The epidemiological basis of the plan for control of ascariasis.] 27 (3), 259–263. [In Russian: English summary p. 263.]
- b. NOVAK, G. E. & PILIPENKO, A. G., 1958.—[Study of *Opisthorchis* infection and its control in the Sumy region of the Ukraine.] 27 (3), 264–270. [In Russian: English summary p. 270.]
- c. RAZUMOVA, E. P., 1958.—[The epidemiology of *Diphyllbothrium* infection among water transport workers and their families.] 27 (3), 271–275. [In Russian: English summary p. 275.]
- d. RIBAKOVA, N. I., 1958.—[Pulmonary paragonimiasis.] 27 (3), 359–360. [In Russian.]
- e. USHAKOVA, A. I., 1958.—[The course of pregnancy in women with ascariasis.] 27 (3), 360. [In Russian.]

(133a) When planning control of ascariasis in man, the type of infection centres present in any one territory should be taken into consideration. Isaev distinguishes two types of foci (populated centres) in Russia; the first type contains only few “microfoci” (separate buildings or yards where the infection is located) and its control is soon achieved through individual eradication of each “microfocus” on detection, the second type contains many “microfoci” and requires planned mass treatment of the population. G.I.P.

(133b) The results of a survey from 1953 to 1956 of *Opisthorchis* infection among the population of the Sumy region in the area of the Dnieper and its tributaries are discussed and mapped; a separate plan gives the rates of infections found in the different villages along the river Vorskla. The centres of infection are situated near rivers and are maintained by the local custom of eating raw, slightly salted fish. Hexachlorethane treatment, undertaken in several populated centres, even when repeated two or three times, gave clinical improvement in half the infected persons but cured only 20%. G.I.P.

(133c) A village on the Svir near Lake Ladoga, mainly populated by water transport workers and their families, was examined for *Diphyllbothrium* infection. The permanent inhabitants were the most heavily infected, the infection however did not depend on the occupation but on the use in food of raw pike roe and rose to a maximum in spring during spawning of the fish. Such villages, particularly when without sewerage, and their infected inhabitants who frequently travel by water, contaminate the water ways and are of great epidemiological significance. G.I.P.

(133d) Ribakova briefly describes the symptoms observed in 48 patients with *Paragonimus ringeri* infection of the lungs. G.I.P.

(133e) *Ascaris* was present in 51.9% of 1,883 pregnant women examined in Ivanovo and was more frequently found in those suffering from toxicosis of pregnancy than in normal ones. Treatment with oxygen was effective in 85.2% out of 100 and with sankafen in 69% out of 203 women, and did not disturb the course of pregnancy. In 75 women, removal of ascarids also led to the loss of the toxic symptoms. G.I.P.

### 134—Memorias de la Sociedad de Ciencias Naturales La Salle.

- a. CABALLERO y C., E. & DÍAZ-UNGRÍA, C., 1958.—“Intento de un catálogo de los tremátodos digenéticos registrados en territorio venezolano.” 18 (49), 19–36.

(134a) The 73 digenetic trematodes known to occur in Venezuela are catalogued, and the original papers in which they were reported for this region are listed with the synonyms, hosts, location in the host body and geographical distribution of each species. A new order named Opisthorchiiformes is made for Opisthorchiata La Rue, 1957 which contained Opisthorchioidea Faust, 1929. R.T.L.

## 135—Nature. London.

- a. SMYTH, J. D., 1958.—“Cultivation and development of larval cestode fragments *in vitro*.” **181** (4616), 1119–1122.
- b. ENGEL, R., HALBERG, F., DASSANAYAKE, W. L. P. & DE SILVA, J., 1958.—“24-hr. rhythms in blood eosinophils and *Wuchereria bancrofti* microfilariae before and after  $\Delta$ -9 $\alpha$ -fluorocortisol.” [Correspondence.] **181** (4616), 1135–1136.
- c. ROGERS, W. P., 1958.—“Physiology of the hatching of eggs of *Ascaris lumbricoides*.” [Correspondence.] **181** (4620), 1410–1411.
- d. FAIRBAIRN, D., 1958.—“Glucose, trehalose and glycogen in *Porrocaecum decipiens* larvae.” [Correspondence.] **181** (4623), 1593–1594.
- e. RIGBY, J. E. & RAWSON, D., 1958.—“A new type of early cysticeroid stage in a cyclophyllidean cestode.” [Correspondence.] **182** (4628), 121–122.
- f. WHITEHEAD, A. G., 1958.—“Nematodes of pyrethrum in East Africa.” [Correspondence.] **182** (4634), 542.
- g. ELLENBY, C. & GILBERT, A. B., 1958.—“Influence of certain inorganic ions on the hatching of the potato root eelworm, *Heterodera rostochiensis* Wollenweber.” **182** (4640), 925–926.
- h. HOLLIS, J. P., 1958.—“Induced swarming of a nematode as a means of isolation.” [Correspondence.] **182** (4640), 956–957.

(135a) Smyth has found that although *Schistocephalus solidus* can be successfully cultured *in vitro*, by means of the techniques he has described elsewhere, and will produce eggs with an 88% fertility, experiments with *Diphyllbothrium dendriticum* using the same techniques have been almost entirely unsuccessful. Some differentiation was obtained in amnion or yolk sac or in dilute embryo extract but the time required was greater than that required for maturation *in vivo* and the tendency for the worms to tie themselves in knots could not be overcome by culturing within cellulose tubing. He has found, however, that by culturing small excised fragments of plerocercoids this difficulty can be overcome. In duck embryo extract (4 gm. tissue per 10 ml. Tyrode) the fragments became segmented by the second day, developed genital anlagen by the third day and differentiated into recognizable proglottides with cirrus, cirrus sac, coiled uterus and testes with mature spermatozoa by the sixth day, but these proglottides were only about one fifth to one tenth the size of those matured in a rat. Maturation beyond this point has not been achieved and further cultivation resulted in the sudden onset of autolysis on the seventh or eighth day. The reasons for this and possible means of overcoming it are discussed. S.W.

(135b) Microfilarial and eosinophil counts were made on the capillary blood of 12 patients with *Wuchereria bancrofti* infection at 90-minute intervals for periods of up to 24 hours. Both were lower in the morning but the correlation between the two rhythms was not statistically significant; the microfilarial rhythm was more regular and had the greater amplitude. Three of the patients were then given  $\Delta$ -9 $\alpha$ -fluorocortisol for three days and 24-hour microfilarial and eosinophil counts were made before and after the administration of this adrenal inhibitor. The results are shown in graphs: the microfilarial periodicity persisted and did not appear to be greatly altered; the excretion of 17-ketosteroids in the urine was slightly depressed; the eosinophil counts made the day after treatment indicated that the patients were escaping from adrenal cortical inhibition. Although no conclusions are drawn the authors consider that the data suggest “that certain phase relations of microfilarial periodicity may be influenced by exogenous corticoids and may, perhaps, be regulated by endogenous periodic cortical adrenal secretions”. S.W.

(135c) Rogers found that under certain circumstances the infective eggs of *Ascaris lumbricoides* could be stimulated *in vitro* to produce inside the egg a hatching fluid which caused the breakdown of the egg-shell and the release of the larva. Optimal conditions for stimulating eggs in bicarbonate-carbon dioxide buffers under carbon dioxide in nitrogen were obtained at pH 8 with 0.02M sodium dithionite. Other reducing agents were less effective. Hatching fluid contained a chitinase, esterase, and possibly a protease. Some characteristics of these enzymes and their role in the hatching process are given. W.P.R.



(135d) Fairbairn carried out analyses of third and fourth-stage larvae of *Porrocaecum decipiens* and obtained the following results which are given on a dry weight basis: trehalose, 6.0%; glucose, 0.6%; glycogen, 55%; lipids, 3.7%.  
W.P.R.

(135e) Rigby & Rawson describe a pre-cystic cestode larva from the pulmonate snail *Oxychilus cellarius*. Older cysticeroids resemble closely those of *Choanotaenia infundibulum*. Mobile tailed larvae, bearing a marked resemblance to digenetic trematode cercariae, could be extracted from young cysts; this tailed larva is unique in possessing four elongated muscular adhesive organs resembling the bothridia of the Tetraphyllidea. Further details of the later stages will be published elsewhere. The paper is illustrated by a photomicrograph and a line drawing.  
S.W.

(135f) Whitehead records parasitism of *Chrysanthemum cinerariaefolium* by *Meloidogyne hapla* and *Aphelenchoides ritzema-bosi* in Kenya and Tanganyika. A root rot disease occurring at altitudes between 7,000 and 9,000 feet in Kenya is associated with an undescribed species of *Pratylenchus*.  
M.T.F.

(135g) When water-soaked cysts of *Heterodera rostochiensis* were placed in solutions of hatching factor containing solutions of chlorides of sodium, potassium, calcium and magnesium singly or combined, there was, as compared with controls, generally less hatch in solutions of monovalent and greater in those of divalent chlorides. The comparisons were made between iso-osmotic solutions: there was no hatch in solutions of the salts alone, and concentration of the salt appeared to have little effect. Potassium usually halved and calcium doubled the hatch as compared with the controls at similar osmotic pressures. It is suggested that the eelworm hatching factor may act by influencing ion transport since quinidine sulphate was found to counteract the inhibiting effect of addition of potassium chloride to hatching factor, and quinidine-like substances are said to influence ion transport in cardiac muscle. Cysts from different sources gave inconsistent results and it is suggested that the "ionic contribution of the cyst contents" may influence their reaction to hatching factor. Experiments in which cysts were presoaked in salt solutions before treatment with hatching factor are held to support this suggestion. Further work is being carried out but from the results already obtained the authors consider it "not improbable that some differences in behaviour of cysts from different sources may be due to the ionic environment to which they have been subjected".  
M.T.F.

(135h) In shallow, aqueous suspensions of soil nematodes containing a high proportion of *Tylenchorhynchus martini*, this species tends to collect in masses. By removing the masses, suspending them again in clean water and allowing them to swarm again a 99% pure suspension of *T. martini* may be obtained.  
M.T.F.

### 136—Nematologica.

- a. GOODEY, J. B., 1958.—"*Sphaeronema minutissimum* n.sp. (Sphaeronematinae: Tylenchulidae)." 3 (3), 169–172. [German summary p. 172.]
- b. WIDDOWSON, E., 1958.—"Observations on the collection and storage of potato root dif-fusate." 3 (3), 173–178. [German summary p. 178.]
- c. TRACEY, M. V., 1958.—"Cellulase and chitinase in plant nematodes." 3 (3), 179–183. [German summary p. 183.]
- d. VAN WEERDT, L. G., 1958.—"Studies on the biology of *Radopholus similis* (Cobb, 1893) Thorne, 1949. Part II. Morphological variation within and between progenies of single females." 3 (3), 184–196. [German summary p. 195.]
- e. CARROLL, K. K., 1958.—"Purification and properties of eelworm hatching factors. Hatching factors for the cabbage, hop and beet root eelworms (*Heterodera cruciferae*, *H. humuli* and *H. schachtii* respectively)." 3 (3), 197–204. [German summary pp. 203–204.]
- f. BIRD, A. F., 1958.—"The adult female cuticle and egg sac of the genus *Meloidogyne* Goeldi, 1887." 3 (3), 205–212. [German summary p. 211.]
- g. GOFFART, H. & HEILING, A., 1958.—"Nebenwirkungen bei der Nematodenbekämpfung mit Shell D-D und verwandten Mitteln." 3 (3), 213–228. [English summary p. 227.]

- h. HOOPER, D. J., 1958.—“*Aphelenchoides dactylocercus* n.sp. and *A. sacchari* n.sp. (Nematoda: Aphelenchoidea).” 3 (3), 229–235. [German summary pp. 234–235.]
- i. WALLACE, H. R., 1958.—“Observations on the emergence from cysts and the orientation of larvae of three species of the genus *Heterodera* in the presence of host plant roots.” 3 (3), 236–243. [German summary p. 243.]
- j. PITCHER, R. S. & CROSSE, J. E., 1958.—“Studies in the relationship of eelworms and bacteria to certain plant diseases. II. Further analysis of the strawberry cauliflower disease complex.” 3 (3), 244–256. [German summary pp. 255–256.]

(136a) *Sphaeronema minutissimum* n.sp. is described and figured. Females and larvae were found on the roots of *Citrus* sp. The female body is almost spherical and about  $66\mu$  in diameter, with an offset neck and head. The lip region has a circumoral elevation and the egg is almost spherical. The nematode is placed in *Sphaeronema* with certain reservations. J.B.G.

(136b) Using newly emerged Arran Banner potatoes in  $6\frac{1}{2}$  in. pots of sandy loam, little difference was found in the hatching activity of successive samples up to 640 ml. per pot. From older plants that had been previously leached, the first 40 ml. were the most active. In a comparison between heavy and restricted watering (yielding 640 and 50 ml. per pot respectively), the restricted watering was the most satisfactory where leaching was continued for several weeks. The activity of diffusate produced by potatoes grown in sand and loam, and in sand only watered with nutrient solution and with distilled water, was highest from the soil plants, which also made the most vigorous growth. A stock of “fresh” diffusate was divided into seven sub-samples which were stored at  $3^{\circ}\text{C}$ . and assayed after one month; the activities were very variable. Assay test in two separate years showed that diffusate was best stored in bulk, withdrawing small samples for experiment as required. E.W.

(136c) The egg-shell of *Heterodera rostochiensis* contains chitin but the larvae and cysts do not. Extracts of *Turbatrix aceti* did not reveal cellulase or chitinase activity, but both enzymes were present in extracts of *Ditylenchus dipsaci*, *D. destructor* and *D. myceliophagus*. The chitinase activity of extracts of *D. destructor* and *D. myceliophagus* was similar, but that of extracts of *D. dipsaci* was greater by a factor of 1.5. The pH optimum of the chitinase and cellulase extracts of *D. dipsaci* was in the region of 5.0. Analysis of the samples of the ditylenchs indicated that these eelworms rely on fat as an energy store. J.J.H.

(136d) Although marked morphological variations are often found between and within populations of *Radopholus similis*, the existence of more than one species is not indicated, since van Weerd's detailed study proves that similar variations occur within populations derived from single females. An interesting abnormality found was a male with a well developed spear but without a bursa—thought to be a case of neoteny. R.D.W.

(136e) Carroll investigated the hatching factors of the hop, beet and cabbage-root eelworms in hop, beet and black mustard root leachates, the last-named containing both beet and cabbage eelworm factors. In general the hop and beet eelworm factors behaved rather like the potato eelworm factor [for abstract see Helm. Abs., 27, No. 48u], but the cabbage eelworm factor, while similar to the potato one in the nature of the dilution curve and in phenol extractability, differed in being more easily eluted from charcoal and less stable towards butanol and formic acid. Hence partial purification by ion exchange chromatography with aqueous formic acid as the eluent, successful in the case of the potato eelworm factor, was not possible here. Attempts to purify the cabbage eelworm factor by partition chromatography and counter-current extractions were not successful. R.D.W.

(136f) After describing the methods and materials used, Bird describes the structure and chemical composition of the egg sac and adult female cuticle of the genus *Meloidogyne*. He concludes that the cuticle in this genus differs from that in *Heterodera* in that frozen sections show that it is not divided into an exo- and endo-cuticle. Both egg sac and cuticle resemble secreted collagens in their reactions to various reagents and both contain phenolic compounds and the enzyme polyphenol oxidase. Bird points out that whilst the cuticle of nematodes is probably derived from the hypodermis, other workers have suggested that the egg sac is probably a uterine secretion. A.M.S.



(136g) This paper investigates the "soil amendment effect" of the nematicide Shell D-D. It concludes that the beneficial action of D-D residues on potatoes and sugar-beet is due to the chlorine content of the chemical. J.J.H.

(136h) Hooper describes and figures *Aphelenchoides dactylocercus* n.sp. and *A. sacchari* n.sp. The former is characterized by its narrow finger-like tail and short post-vulval sac. The latter is characterized by its rather short oesophagus, short female tail and the shape and small size of the spicules in the male. Both species have three incisures on the lateral field. These two species are fungivorous and are easily cultured on mushroom mycelium (*Agaricus hortensis* Cooke). D.J.H.

(136i) The relationship between the rate of emergence of larvae from cysts and pressure deficiency in sand is described for *Heterodera major*, *H. schachtii* and *H. rostochiensis*. There is an optimal pressure deficiency for emergence in *H. schachtii* and *H. major*. Attraction to roots of host plants occurs in all three species and the data suggest that orientation is to a concentration gradient of some chemical substance secreted by the roots. H.R.W.

(136j) Pitcher & Crosse, after briefly recapitulating the results of their previous investigations, in which they showed how various symptoms were attributable to either eelworm (*Aphelenchoides ritzema-bosi* and *A. fragariae*) or bacterium (*Corynebacterium fascians*) or to both together, have sought to define more precisely the relative roles of the two pathogens in the aetiology of cauliflower disease in strawberry. After a description of techniques for aseptic culture of strawberry plants and the preparation of bacteria-free eelworms, it is shown that eelworms are solely responsible for the production of alamine leaves, although *C. fascians* may be associated without playing a causal role. It is also concluded that cauliflower disease originates as a leafy gall initiated by virulent strains of the bacterium and modified by the eelworms. It is suggested that *C. fascians* is normally present in healthy strawberries as a saprophyte but may become pathogenic when plants are invaded by eelworms. A.M.S.

### 137—Netherlands Journal of Agricultural Science.

- a. HUIJSMAN, C. A., 1958.—"Resistance to the potato root eelworm in *S. tuberosum* subsp. *andigena* and its importance for potato breeding." 6 (1), 39-46.

(137a) Resistance to *Heterodera rostochiensis* has been found in some clones of the diploids *Solanum macolae* and *S. famatinae*, as well as in certain clones of the known resistant species, *S. vernei*, *S. sucrense* and *S. tuberosum* subsp. *andigena*. The *andigena* clone C.P.C. 1673 has been the most widely used resistant parent in the Dutch breeding work and Huijsman discusses the nature of inheritance of the resistance. The commercial importance of the new resistant potatoes is difficult to assess, in view of the discovery in Peru, England and Scotland of races of the eelworm capable of attacking these potatoes. A footnote indicates that such races have now been found in Holland. R.D.W.

### 138—New Zealand Journal of Agricultural Research.

- a. CLARKE, E. A. & FILMER, D. B., 1958.—"Studies in hogget rearing. II: The role of parasites in hogget ill-thrift." 1 (3), 382-417.

(138a) It is concluded from the results of seven trials on parasite control and grazing methods, that nematodes, with the possible exception of *Haemonchus contortus*, play only a secondary role in the ill-thrift of hoggets. Rotational grazing gave no advantage over set-stocking in the level of parasites and ill-thrift. In spite of regular and frequent phenothiazine drenching, which did reduce nematode levels particularly *H. contortus*, ill-thrift occurred in the autumn and early winter. Species of *Trichostrongylus* were more effectively controlled with fine particle (less than 10 $\mu$ ) phenothiazine. Hoggets reared on dairy farm and beef-fattening pastures remained thrifty in spite of parasite levels, while hoggets reared worm free and weaned on to uninfected pastures showed typical ill-thrift in autumn on fresh grass growth which followed topping and rain. G.I.P.

**139—New Zealand Journal of Agriculture.**

- a. ANON., 1958.—“Precautions to keep household poultry free of worms.” **96** (3), 264.
- b. THOMAS, P. L., 1958.—“Boiling offal to destroy hydatids before it is used for dog food.” **96** (3), 271-272.

(139b) From a controlled experiment, Thomas concludes that if offal, infected with hydatid cysts, is kept at a rolling boil for ten minutes (with a total of about 20 minutes at 100°C.) it can be fed to dogs without any danger of causing infection with *Echinococcus granulosus*. The type of oil-fired cooker used in the experiment is described. S.W.

**140—New Zealand Veterinary Journal.**

- a. GEMMELL, M. A., 1958.—“Impressions of the cestode problems of domestic animals in New Zealand, with special reference to the control of hydatid disease.” **6** (4), 106-110.

(140a) Gemmell bases this paper on known epidemiological factors occurring in Australia and the information which is available in New Zealand, but no statistical surveys of the cestodes of wild and domestic animals in New Zealand have previously been undertaken. Practically the whole of New Zealand appears to be within an endemic region for hydatid by virtue of favourable climatic conditions for the survival of *Echinococcus granulosus*. He discusses this and the losses, both actual and potential, caused by hydatid and *Cysticercus tenuicollis* in sheep (in old sheep more than 50% of the livers may be condemned). Problems of control are discussed and the role of the newly formed Hydatid Research Unit outlined. S.W.

**141—Opuscula Zoologica. Instituti Zoosystematici Universitatis Budapestinensis.**

- a. ANDRÁSSY, I., 1958.—“*Dorylaimus deuberti* n.sp., eine neue süßwasserbewohnende Nematoden-Art.” **2** (4), 3-6.
- b. ANDRÁSSY, I., 1958.—“Noch einmal über die Gattung *Chronogaster* Cobb, 1913.” **2** (4), 7-11.

(141a) Andrassy describes and figures *Dorylaimus deuberti* n.sp. from Hungary. It has a double spear guide, short tail and scarcely offset head. The male has 16 to 19 pre-anal supplements in an unbroken row. It is nearest to *D. pacificus* Cobb, 1906, *D. varicaudatus* Thorne, 1929 and *D. hyalinus* Thorne & Swanger, 1936. J.B.G.

(141b) Andrassy says that *Cephalobus longicollis* Daday, 1899, is a *Chronogaster* and identical with *C. gracilis* Cobb, 1913. As this is the type of the genus it becomes *Chronogaster longicollis* (Daday, 1899) n.comb. He further names his *Chronogaster* sp. of 1956, *C. subtilis* n.sp. and gives a key to the six species now in the genus. J.B.G.

**142—Phytopathology.**

- a. MAI, W. F., 1958.—“Small field plots for experiments involving plant pathogenic nematodes.” [Abstract of paper presented at the 18th Annual Meeting of the Northeastern Division of the American Phytopathological Society, West Springfield, Mass., November 7-8, 1957.] **48** (5, Sect. 1), 263.
- b. MILLER, P. M. & TAYLOR, G. S., 1958.—“Superior control of tobacco stunt nematodes with a nematocide mixture.” [Abstract of paper presented at the 18th Annual Meeting of the American Phytopathological Society, West Springfield, Mass., November 7-8, 1957.] **48** (5, Sect. 1), 264.

(142a) Small plots, 5 ft. × 8 ft., with wooden surrounds and separated by paths 2 ft. wide, were filled with mechanically mixed soil infested with *Heterodera rostochiensis*, and have been used successfully in various experiments over the past ten years. Controlled watering is possible, using a portable irrigation plant, and appropriate precautions and hygienic measures prevent the eelworms spreading from plot to plot. R.D.W.

(142b) Fumigation of soil with Dorlone (a mixture of 19% ethylene dibromide and 75% 1,3-dichloropropene) gave an 85% increase in height of tobacco plants. Soil and greenhouse tests suggest that this increased growth was due to control of the tobacco stunt nematode, *Tylenchorhynchus claytoni*. The results indicate that a combination of nematicides may give improved control of nematodes. H.R.W.



**142—Phytopathology (cont.)**

- †c. BAIN, D. C., 1958.—“Reaction of red and white clover introductions to root-knot nematodes.” 48 (6), 341.
- †d. BIRCHFIELD, W. & VAN PELT, H. M., 1958.—“Thermotherapy for nemas of ornamental plants.” 48 (6), 341.
- †e. DICKERSON, O. J. & SLACK, D. A., 1958.—“Parasitic nematodes associated with strawberries in Arkansas.” 48 (6), 342.
- †f. FOSTER, H. H. & COHOON, D. F., 1958.—“Post-plant fumigation for the control of peach root-knot in South Carolina.” 48 (6), 342.
- †g. GRAHAM, T. W., 1958.—“Root-knot and other nematodes in relation to the development of tobacco black shank.” 48 (6), 343.
- †h. MCGUIRE, J. M., WALTERS, H. J. & SLACK, D. A., 1958.—“The relationship of root-knot nematodes to the development of Fusarium wilt in alfalfa.” 48 (6), 344.

(142c) An investigation was carried out of the susceptibility of 13 white and 48 red clover introductions to the root-knot nematodes *Meloidogyne incognita*, *M. incognita* var. *acrita*, *M. arenaria* and *M. javanica*. Most plants were moderately to severely infected by all four species of nematodes, as were the controls. One of the red clovers was lightly infected by *M. arenaria* and two by *M. javanica*. [Results for the white clovers are not clear owing to a printer's error.] The results suggest that it may be possible to select white clovers resistant to *M. incognita* var. *acrita* and *M. javanica*, and red clovers resistant to *M. arenaria* and *M. javanica*. M.T.F.

(142d) [This paper appears in full in *Plant Dis. Rept.*, 1958, 42, 451-455. For abstract see *Helm. Abs.* 27, No. 54s.]

(142e) In plant and soil samples from 93 strawberry fields in Arkansas, nematodes of the genera *Pratylenchus*, *Xiphinema*, *Tylenchorenus* [? *Tylenchorhynchus*], *Meloidogyne*, *Aphelenchoides*, *Helicotylenchus*, *Tylenchus*, *Psilenchus* and *Aphelenchus* were found. Results of a special survey for *Aphelenchoides besseyi* have been given elsewhere, [for abstract see *Helm. Abs.* 26, No. 132a]. Of the other species present only *Pratylenchus coffeae* was associated with strawberry disease, being present in large numbers where black root rot occurred on relatively heavy soil. R.D.W.

(142f) The application of liquid nemagon at the rate of 8 gal. of active ingredient per acre at the roots of peach trees gave good control of root-knot nematodes. Liquid nemagon was found to be more effective than the granular form and it is suggested that the nematocide may remain effective for at least two years after fumigation. H.R.W.

(142g) Tobacco seedlings of the variety Dixie Bright 101 were transplanted to field plots inoculated, after previous fumigation with methyl bromide, with either the black shank fungus *Phytophthora parasitica* var. *nicotianae* alone or in combination with one of four nematode species parasitic on tobacco. Only a trace of black shank developed on plants grown with the fungus alone, with the fungus and *Rotylenchus brachyurus* or with the fungus and *Pratylenchus brachyurus*, although in the last case the roots showed damage. Slight to moderate black shank developed in the presence of the fungus and *Tylenchorhynchus claytoni*, with very slight root injury, while moderate to severe black shank occurred in the presence of the fungus and *Meloidogyne incognita* var. *acrita*. M.T.F.

(142h) The effects of wilt, *Fusarium oxysporum* f. *vasinfectum*, alone and in combination with five *Meloidogyne* species were tested on the Buffalo variety of lucerne. After four months 95% of plants inoculated with *Fusarium* and *M. hapla* were infected with wilt, 60% of those with *M. javanica* and *Fusarium*, 50% of those with *M. incognita* and *Fusarium* and with *M. arenaria* and *Fusarium*, 15% of those with *Fusarium* alone and 10% of those with *M. incognita* var. *acrita*. The severity of wilt infection and the number of plants infected were proportional to the severity of the root-knot disease. M.T.F.

†Abstract of paper presented at the 1958 Annual Meeting of the Southern Division, American Phytopathological Society, Little Rock, Ark., February 3-5, 1958.

**142—Phytopathology (cont.)**

- †i. NUSBAUM, C. J., 1958.—“The response of root-knot-infected tobacco plants to foliar applications of maleic hydrazide.” **48** (6), 344.
- †j. POWELL, N. T. & NUSBAUM, C. J., 1958.—“The effect of root-knot nematode resistance in the incidence of black shank in tobacco.” **48** (6), 344.
- †k. RIGGS, R. D. & WINSTEAD, N. N., 1958.—“Attempts to transfer root-knot resistance in tomato by grafting.” **48** (6), 344.
- l. STANFORD, E. H., GOPLEN, B. P. & ALLEN, M. W., 1958.—“Sources of resistance in alfalfa to the northern root-knot nematode, *Meloidogyne hapla*.” **48** (7), 347-349.
- m. NORTON, D. C., 1958.—“The association of *Pratylenchus hexincisus* with charcoal rot of sorghum.” **48** (7), 355-358.
- ††n. BAINES, R. C., CLARKE, O. F. & CAMERON, J. W., 1958.—“A difference in the pathogenicity of the citrus nematode from trifoliate orange and sweet orange roots.” **48** (8), 391.

(142i) Root-knot infections on tobacco reduced the effect of maleic hydrazide on plant growth. Maleic hydrazide applied to the leaves also inhibited the development of galls and reproduction of the root-knot nematodes. H.R.W.

(142j) By means of back-crosses resistance to *Meloidogyne incognita* and *M. incognita* var. *acrita* was incorporated into black-shank-resistant flue-cured tobacco. Root-knot susceptible plants were found to be more susceptible to the black shank fungus (*Phytophthora parasitica* var. *nicotianae*) than root-knot resistant plants. It is concluded that by combining root-knot resistance with black shank resistance the losses from black shank in the resistant varieties would be reduced. M.T.F.

(142k) Plants of the resistant tomato line Hawaii 5229 and the susceptible line STEP 174 were approach grafted in pairs and after two weeks the stock of one and scion of the other were removed. Two weeks later the roots or the tops were inoculated with *Meloidogyne incognita*. In all combinations the resistant root stock or scion remained resistant and the susceptible stock or scion became galled, indicating that resistance or susceptibility was inherent in the cells of roots and tops and did not cross the graft union. M.T.F.

(142l) The lucerne variety Vernal and a common strain Hilmar were found to be resistant to *Meloidogyne hapla*. This resistance is genetic and it is suggested that a breeding programme could be initiated based on the results of this research. H.R.W.

(142m) Green-house experiments suggest that the fungus *Macrophomina phaseoli* (charcoal rot) and the nematode *Pratylenchus hexincisus* act independently in causing disease in sorghum. For both pathogens the effect on the sorghum was more serious under dry soil conditions. H.R.W.

(142n) Larvae of *Tylenchulus semi-penetrans* collected from the roots of *Poncirus trifoliata* in three orchards and from sweet orange roots in another were used to inoculate seedlings of *P. trifoliata* and Standard sour orange, the former from self-pollinated flowers (varieties Fawcett-Webber and Pomeroy) the latter from open-pollinated flowers. The nematodes from the three *P. trifoliata* orchards infected 10% of the *P. trifoliata* seedlings moderately and 90% slightly and the sour orange seedlings moderately to severely. There were only slight differences in the effects due to nematodes from the different sources and on the two host varieties. Nematodes from sweet orange roots slightly infested only 1% of *P. trifoliata* seedlings but there was moderate to severe infestation of sour orange seedlings. M.T.F.

†Abstract of paper presented at the 1958 Annual Meeting of the Southern Division, American Phytopathological Society, Little Rock, Ark., February 3-5, 1958.

††Abstract of paper presented at 50th Annual Meeting of the American Phytopathological Society, Bloomington, Ind., August 24-28, 1958.



**142—Phytopathology (cont.)**

- ††o. FEDER, W. A., 1958.—“Aseptic culture of the burrowing nematode, *Radopholus similis* (Cobb) Thorne on excised okra root tissues.” 48 (8), 392–393.
- ††p. FELDMESSER, J., 1958.—“Burrowing nematode population sampling as affected by a number of variables.” 48 (8), 393.
- ††q. HEWITT, W. B., RASKI, D. J. & GOHEEN, A. C., 1958.—“Transmission of fanleaf virus by *Xiphinema index* Thorne & Allen.” 48 (8), 393–394.
- ††r. LOWNSBERRY, B. F. & VIGLIERCHIO, D. R., 1958.—“Mechanism of accumulation of *Meloidogyne hapla* around roots of tomato seedlings.” 48 (8), 395.
- ††s. MANKAU, R., 1958.—“Pathological disturbances caused by *Heterodera trifolii* in susceptible and resistant plants.” 48 (8), 395.
- ††t. PERRY, V. G., 1958.—“A disease of Kentucky blue grass incited by certain spiral nematodes.” 48 (8), 397.

(142o) Females of *Radopholus similis* surface-sterilized for two minutes in 1:1,000 mercuric chloride and placed in sterile cultures of okra roots in a modified White culture medium established themselves successfully. The cultures were incubated in the dark at 27°C. and up to 2,000 nematodes of all stages were obtained from 58 mg. of roots in a month. M.T.F.

(142p) Observations made at weekly intervals in two citrus groves infested with *Radopholus similis* indicate that relative soil moisture has little influence on the numbers of nematodes within, on or in a radius of one inch of feeder roots. Nematode numbers varied more between sampling dates than between samples taken on the same date. The higher the temperature the fewer nematodes were found. There was a correlation between the numbers of nematodes found within roots and on their surface. M.T.F.

(142q) When a healthy grape and a fanleaf-diseased grape were grown together in soil inoculated with *Xiphinema index* taken from around healthy grape or fig, the healthy grape developed fanleaf disease. Grapes remained healthy when grown alone or with *X. index* from healthy grape or fig, or with fanleaf-diseased grape in the absence of *X. index*. Populations of *X. index* increased very greatly in the presence of grape. M.T.F.

(142r) Free larvae of *Meloidogyne hapla* were placed on sand in a glass cone suspended with its tip at the centre of a Syracuse dish covered with moist sand. After 24 hours larvae had accumulated on that side of the dish where there was a tomato seedling even when a dialytic membrane was interposed. It is concluded that larvae accumulate in response to a dialysable agent effective at a distance from the root. M.T.F.

(142s) A continuous, multinucleate syncytium, increasing by coalescence of adjacent cells, developed in the stele around the head of *Heterodera trifolii* in the favourable host, Ladino clover. No conspicuous hypertrophy of cells or nuclear division was observed. Tubular structures were seen in the syncytium associated with the nematode's stylet. In pea, reaction to the nematode was very variable, often with necrosis. Only occasional females developed normally in red clover and in individual plants of other resistant crops. Size of mature nematodes and rate of development were correlated with size and rate of development of syncytia. M.T.F.

(142t) By means of green-house inoculations, field control experiments and histological studies certain undescribed species of *Helicotylenchus* have been shown to damage *Poa pratensis* turf in central and southern Wisconsin. Stunting, discoloured roots and “summer dormancy” are the main symptoms and these have been corrected by applications of nematocides. The nematodes have frequently been observed feeding on the grass roots. M.T.F.

††Abstract of paper presented at 50th Annual Meeting of the American Phytopathological Society, Bloomington, Ind., August 24–28, 1958.

**142—Phytopathology (cont.)**

- ††u. THOMASON, I. J., 1958.—“The effect of the root-knot nematode, *Meloidogyne javanica*, on blackeye bean wilt.” **48** (8), 398.
- ††v. VAN GUNDY, S. D., 1958.—“The pathogenicity of *Hemicycliophora arenaria* on citrus.” **48** (8), 399.
- w. PERRY, V. G., 1958.—“Parasitism of two species of dagger nematodes (*Xiphinema americanum* and *X. chambersi*) to strawberry.” **48** (8), 420–423.
- †††x. COURSEN, B. W. & JENKINS, W. R., 1958.—“Host-parasite relationships of the pin nematode, *Paratylenchus projectus*, on tobacco and tall fescue.” **48** (8), 460.
- †††y. CRITTENDEN, H. W., 1958.—“Histology and cytology of susceptible and resistant soybeans infected with *Meloidogyne incognita acrita*.” **48** (8), 461.

(142u) In green-house tests with two varieties of *Vigna sinensis* (Grant and Chino 3), Fusarium wilt was more severe in the presence of root-knot nematodes than in their absence. Grant was resistant to some isolates of *Fusarium oxysporum* f. *tracheifilum*, but resistance was reduced in root-knot infected plants. Fusarium wilt was reduced and yields increased in two fields of sandy soil when root-knot nematodes were controlled by soil fumigation. M.T.F.

(142v) A distinctive galling of terminal and lateral root tips was associated in the field with parasitism of *Citrus limonia* by *Hemicycliophora arenaria*. Galling was produced experimentally in seedlings of lemon but not sweet orange (*Citrus sinensis*) inoculated with 250 hand-picked nematodes and grown in soil temperature tanks. After five months growth at 30°C., 350 galls were found and at 25°C. there were 100 galls. At 30°C. there was a 35% reduction of top growth. Nematodes recovered from soil and roots of lemon averaged 160,000 and 10,000 per plant respectively in the 30°C. and 25°C. tanks. Cells adjacent to the head of the nematodes showed hypertrophy of the nuclei. With sweet orange the final nematode populations were reduced below those of the inocula. M.T.F.

(142w) Three varieties of strawberry growing in sterilized soil were inoculated with *Xiphinema americanum* or *X. chambersi* obtained from a strawberry field or raspberry plantation. No difference between an inoculated plant and its control was observed after two months, but six to seven months after inoculation large numbers of dagger nematodes were obtained from other inoculated plants. Moderate root injury with dark lesions and blinded tips was found on plants inoculated with *X. americanum*, and rather more severe injury, proportional to the size of the inoculum, occurred with *X. chambersi*. It is concluded that dagger nematodes cause mechanical damage to the roots of strawberry and it is suggested that the primary lesions are invaded by fungi and bacteria. It is thought probable that additional damage is caused by injection of oesophageal gland secretions by the nematodes. M.T.F.

(142x) This paper is published in full, under the same title [in *Plant Dis. Rept.*, **42**, 865–872, for abstract see No. 143n below]. Additional information given in this abstract, however, is that 97 species and varieties of plant from ten families supported *Paratylenchus projectus* populations for 60 days, but that no nematodes were recovered from carrot (var. Chantenay), pepper (California Wonder) or cucumber (varieties Marketer and Palmetto). M.T.F.

(142y) In a comparison of three resistant with five susceptible soya bean varieties inoculated with *Meloidogyne incognita* var. *acrita*, Crittenden found that, as compared with susceptible varieties, the resistant varieties had fewer giant cells with less dense cytoplasm and fewer enlarged nuclei, a smaller giant cell area, which did not spread into the pericycle, and the nematode head was not surrounded by giant cells. M.T.F.

††Abstract of paper presented at 50th Annual Meeting of the American Phytopathological Society, Bloomington, Ind., August 24–28, 1958.

†††Abstract of paper presented at 15th Annual Meeting of the Potomac Division, American Phytopathological Society, Beltsville, Md., February 27–28, 1958.



**142—Phytopathology (cont.)**

- †††z. FERVER, A. F. & CRITTENDEN, H. W., 1958.—“Host-parasite relationships of *Avena sativa* and a root-knot nematode, *Meloidogyne incognita acrita*.” 48 (8), 461.
- †††ba. ROHDE, R. A. & JENKINS, W. R., 1958.—“The chemical basis of resistance of asparagus to the nematode *Trichodorus christiei*.” 48 (8), 463.
- †††bb. TAYLOR, A. L. & BUHRER, E. M., 1958.—“A preliminary report on distribution of root-knot nematode species in the United States.” 48 (8), 464.

(142z) Comparisons between two root-knot nematode resistant varieties of oat, Arlington and Atlantic, and two susceptible, Lee and Forkeddeer, revealed no differences in amino-acids or sugars in non-infected roots. There was enlargement of the stele and cortex in infected roots of all varieties, but few galls or mature females in the resistant ones. Giant cells around the nematode head showed dense cytoplasm and aggregation of nuclei in both resistant and susceptible varieties. In 40-day-old uninfected roots the inner tangential cell walls of the endodermis were thicker in the resistant than in the susceptible varieties. M.T.F.

(142ba) Populations of *Trichodorus christiei* declined as quickly in the presence of young plants of *Asparagus officinalis* (var. Mary Washington) as in sterile soil, and more quickly when the plants were older. Juice from asparagus roots diluted 1 : 10 was toxic to *T. christiei* while that from tomato roots was not. A toxic carbohydrate-like product with approximate molecular weight of 148 and a proposed empirical formula of  $C_6H_{12}O_4$  was extracted from roots and root leachates. It caused irreversible paralysis of nematodes in water solutions of 100 p.p.m. or less. Spraying the leaves or drenching the root zone of tomato seedlings with solutions of 1,000 p.p.m. of the compound reduced *T. christiei* populations in the vicinity. M.T.F.

(142bb) The commonest species of *Meloidogyne* in the U.S.A. are *M. incognita* and *M. incognita* var. *acrita* to the south of Washington D.C. and *M. hapla* to the north. *M. arenaria* and *M. hapla* are fairly common where peanuts are grown: *M. javanica* is scattered in southern and south-western States, and *M. arenaria* subsp. *thamesi* has been found only in Florida. There is evidence of repeated introduction of *Meloidogyne* spp. in planting material, and also of considerable movement between States. M.T.F.

**143—Plant Disease Reporter.**

- a. GILL, D. L., 1958.—“Effect of root-knot nematodes on Fusarium wilt of mimosa.” 42 (5), 587–590.
- b. SUMMERS, T. E., PATE, J. B. & WILSON, F. D., 1958.—“Extent of susceptibility within kenaf, *Hibiscus cannabinus* L., to root-knot nematodes.” 42 (5), 591–593.
- c. EPPS, J. M., 1958.—“Viability of air-dried *Heterodera glycines* cysts.” 42 (5), 594–595.

(143a) Seedlings of *Albizia julibrissin* were grown in steam-sterilized or methyl bromide-fumigated soil inoculated with either (i) *Fusarium oxysporum* f. *perniciusum*, (ii) *Meloidogyne incognita* or *M. javanica*, (iii) the fungus and one of the nematode species or (iv) uninoculated. More wilting occurred in treatment (iii) than in (i) and more seedlings survived in (i) and (ii) than in (iii). Fewer plants survived in uninoculated soil than in soil infested with nematodes alone. This was thought to be due to crowding of the seedlings. M.T.F.

(143b) Eighty-nine varieties, lines and selections of *Hibiscus cannabinus* have been tested for resistance to *Meloidogyne incognita* and *M. incognita* var. *acrita*. Susceptibility ratings based on the amount of galling of the roots have shown reduced susceptibility in selected lines as compared with the parents. M.T.F.

(143c) No viable larvae of the soya bean cyst nematode were found in cysts stored for one month or longer with soya bean seed in bags. Cysts stored with soya bean seed in large clay saucers contained live larvae after one month's storage, but no live larvae were found here after two months. J.J.H.

†††Abstract of paper presented at 15th Annual Meeting of the Potomac Division, American Phytopathological Society, Beltsville, Md., February 27–28, 1958.

**143—Plant Disease Reporter (cont.)**

- d. DROLSOM, P. N. & MOORE, E. L., 1958.—“Reproduction of *Meloidogyne* spp. in flue-cured tobacco lines of root-knot resistant parentage.” **42** (5), 596–598.
- e. KRUSBERG, L. R. & HIRSCHMANN, H., 1958.—“A survey of plant parasitic nematodes in Peru.” **42** (5), 599–608.
- f. SCHINDLER, A. F., 1958.—“Poor growth of roses in commercial greenhouse beds infested with the fungus, *Lepiota morgani*.” **42** (5), 713–714.
- g. SUMMERS, T. & SEALE, C. C., 1958.—“Root-knot nematodes, a serious problem of kenaf in Florida.” **42** (6), 792–795.
- h. PATE, J. B., SUMMERS, T. E. & MENZEL, M. Y., 1958.—“Resistance of *Hibiscus eetveldianus* to root-knot nematodes and the possibilities of its use as a source of resistance in kenaf, *Hibiscus cannabinus* L.” **42** (6), 796–797.
- i. FERRIS, V. R. & BERNARD, R. L., 1958.—“Plant parasitic nematodes associated with soybeans in Illinois.” **42** (6), 798–801.

(143d) Thirteen  $F_5$  and  $F_6$  breeding lines of flue-cured tobacco (*Nicotiana tabacum*) were tested for resistance to *Meloidogyne incognita*, *M. incognita* var. *acrita*, *M. javanica*, *M. arenaria* and *M. hapla*. The plants were classified according to the relative number of egg masses present 60–70 days after inoculation. The production of eggs was abundant on plants of all lines inoculated with *M. javanica*, *M. arenaria* and *M. hapla*, although there were more eggs and more root decay on the susceptible controls. Very few eggs were produced on any line by *M. incognita* and *M. incognita* var. *acrita* but in five lines one or two plants were found with a few egg masses.

M.T.F.

(143e) In 208 collections of nematodes made in Peru, there were 33 plant-parasitic species representing 14 genera. The genus *Heterodera* was virtually confined to the mountainous region, *H. rostochiensis* being the most important plant nematode there, with *H. schachtii* and *H. major* also present. *Meloidogyne* spp. (including *M. incognita*, *M. incognita* var. *acrita* and *M. exigua*) were most important in the selva (jungle) and irrigated coastal regions. Other genera found were *Pratylenchus*, *Tylenchorhynchus*, *Rotylenchus*, *Helicotylenchus*, *Trichodorus* and (less frequently) *Xiphinema*, *Criconemoides*, *Hemicriconemoides*, *Paratylenchus*, *Hemicylichophora*, *Tylenchulus* and *Hoplolaimus*.

R.D.W.

(143f) Schindler concludes that biological control of *Lepiota morgani* (a basidiomycetous fungus associated with poor growth of green-house roses) with the mushroom spawn nematode, *Ditylenchus* sp., is not feasible as the nematode failed to survive on cultures of the fungus.

R.D.W.

(143g) Root-knot nematodes *Meloidogyne incognita* and *M. incognita* var. *acrita* are present in soils where *Hibiscus cannabinus* (kenaf) shows poor growth and death of seedlings in Florida. Experimental plots of infested soil were fumigated with 40 gal. per acre of chloropicrin two weeks before sowing kenaf. At harvest, four months later, the green weight and dry fibre weight of plants from treated plots were nearly twice as great as from the controls.

M.T.F.

(143h) While *Hibiscus cannabinus* is severely galled by *Meloidogyne incognita* and *M. incognita* var. *acrita*, *H. eetveldianus* is very lightly galled. Attempts were made, by crossing the two species, to transfer resistance to *H. cannabinus*.  $F_1$  hybrids proved almost completely sterile but after colchicine treatment seeds were formed and progeny from these amphiploids showed a high degree of resistance to root-knot. There was very little segregation for plant type in the amphiploids and fibre production was poor. Attempts to cross with both parent species were unsuccessful.

M.T.F.

(143i) Ferris & Bernard describe their sampling methods and list the genera found in soya bean fields from various locations, together with previous cropping. The genera found to be widely distributed include *Pratylenchus*, *Paratylenchus*, *Helicotylenchus* and *Tylenchorhynchus*. Comparisons among fields under rotation indicated that the higher counts of *Pratylenchus* and *Helicotylenchus* in the soil were often associated with maize, whereas the higher counts of *Paratylenchus* were associated with soya bean culture.

A.M.S.



## 143—Plant Disease Reporter (cont.)

- j. GASKIN, T. A., 1958.—“Weed hosts of *Meloidogyne incognita* in Indiana.” 42 (6), 802–803.
- k. NEWHALL, A. G., 1958.—“The incidence of Panama disease of banana in the presence of the root knot and the burrowing nematodes (*Meloidogyne* and *Radopholus*).” 42 (7), 853–856.
- l. O'BANNON, J. H., 1958.—“Application of emulsifiable dibromochloropropane in irrigation water as a preplanting soil treatment.” 42 (7), 857–860.
- m. LEAR, B. & RASKI, D. J., 1958.—“Control of soil fumigation of root-knot nematodes affecting sugar beet production in California.” 42 (7), 861–864.
- n. COURSEN, B. W. & JENKINS, W. R., 1958.—“Host-parasite relationships of the pin nematode, *Paratylenchus projectus*, on tobacco and tall fescue.” 42 (7), 865–872.
- o. CHRISTIE, J. R. & BIRCHFIELD, W., 1958.—“Scribner's lesion nematode, a destructive parasite of amaryllis.” 42 (7), 873–875.
- p. BAINES, R. C., DEWOLFE, T. A. & SMALL, R. H., 1958.—“Control of the citrus nematode, *Phytophthora* spp. and weeds by Mylone 85W when applied by different methods.” 42 (7), 876–880.
- q. SPRUYT, F. J., 1958.—“Susceptibility of serradella to root-knot nematodes.” 42 (7), 897.

(143j) Gaskin tested a number of weeds common in Indiana for susceptibility to a mixed infection of *Meloidogyne incognita* and *M. incognita* var. *acrita*. The criterion of susceptibility was the presence of mature female eelworms on the roots after 45 days growth in the greenhouse. 70 plants were found to be susceptible and 23 resistant. Nearly all are new records for these species of *Meloidogyne*. M.T.F.

(143k) Newhall showed that the presence of *Radopholus similis* attacking roots of banana growing in soil heavily infested with *Fusarium oxysporum* f. *cubense* greatly increased the incidence of Panama disease. The presence of *Meloidogyne* spp. during the four months for which the experiment ran, had no effect. J.B.G.

(143l) The application of emulsifiable dibromochloropropane in irrigation water on nematode infested land is described. The distribution and penetration of the nematicide was assessed indirectly by determining the effect of the bromine in the treated soil on onion seed. H.R.W.

(143m) Applications of D-D, EDB, Telone and Nemagon gave good control of root-knot nematodes in sugar-beet and increased yield and sugar content. Lear & Raski state that the cost of pre-planting treatments on this type of soil would be offset by increased yields. H.R.W.

(143n) In green-house pot tests the general effects of *Paratylenchus projectus* on tobacco and tall fescue were stunting of top growth and root proliferation, with increased tillering of the fescue. No direct evidence of feeding on the roots of either host could be detected under the microscope. Small initial populations increased more rapidly than larger ones, indicating a tendency for all populations to reach the same level eventually, with food probably a limiting factor. R.D.W.

(143o) Christie & Birchfield describe how the species *Tylenchus penetrans* described by Cobb was subsequently found to be two species, the male being given Cobb's name for the species, now called *Pratylenchus penetrans* and the female being renamed by Steiner *Pratylenchus scribneri*. This latter is thought to be identical with the nematode described but not identified by Scribner in 1889 from Irish potatoes in Tennessee. Attacks by *P. scribneri* on amaryllis in Florida are described and a list of other hosts of this parasite is given. It is suggested that *P. scribneri* is one of the most common species of *Pratylenchus* occurring in Florida. A.M.S.

(143p) The ability of Mylone 85W to control the citrus nematode (*Tylenchulus semi-penetrans*), soil fungi (*Phytophthora* spp.) and a number of weeds was studied. Data show that method of application and amount of water are important factors in achieving control. H.R.W.

(143q) In pot tests serradella (*Ornithopus sativus*) was found susceptible to *Meloidogyne javanica*, *M. arenaria*, *M. hapla*, *M. incognita* and *M. incognita* var. *acrita*. R.D.W.

**143—Plant Disease Reporter (cont.)**

- r. FEDER, W. A. ET AL, 1958.—“Citrus varieties, species, and relatives susceptible to attack and damage by the burrowing nematode, *Radopholus similis*.” 42 (8), 934-937.
- s. STOVER, R. H. & FIELDING, M. J., 1958.—“Nematodes associated with root injury of *Musa* spp. in Honduran banana soils.” 42 (8), 938-940.
- t. RASKI, D. J. & RADEWALD, J. D., 1958.—“Reproduction and symptomatology of certain ectoparasitic nematodes on roots of Thompson seedless grape.” 42 (8), 941-943.
- u. REYNOLDS, H. W., 1958.—“Control of the cotton root-knot nematode on extra-long-staple cotton.” 42 (8), 944-947.
- v. RENNINGER, G., COFFEY, J. & SOKOLOFF, B., 1958.—“Effect of hydrogenated fish oils on citrus-tree destroying nematodes.” 42 (9), 1057-1065.

(143r) Feder *et al.* screened nearly 400 named varieties, species and relatives of citrus and found them all to be susceptible to damage by the burrowing nematode, *Radopholus similis*. Species tested included: Sweet orange—eighty-four varieties; Mandarin—thirty-nine varieties; Mandarin (Satsumas)—twenty-one varieties; Grapefruit (Pumelo and Shaddock)—thirty-seven varieties; Lemon—thirty-seven varieties; Lime—thirteen varieties; Citron—six varieties; Tangelo—thirty-two varieties; Sour orange—nineteen varieties; Citrange—ten varieties; and fifty-eight miscellaneous citrus, citrus relatives and hybrids. Although none of the material tested was found to be immune thirteen selections showed some tolerance to attack.

D.J.H.

(143s) In studies on the possible role of nematodes in the spread of banana wilt caused by *Fusarium oxysporum* f. *cubense*, the authors found 12 species of plant-parasitic nematodes associated with *Musa* crops, *Meloidogyne arenaria* and *Hoplolaimus* sp. predominating in root and soil samples from bananas on loam and clay-loam, and *Pratylenchus musicola* and *Radopholus similis* predominating in root samples from abaca and plantain on sandy loam.

R.D.W.

(143t) Seven replications of 100 specimens each of *Trichodorus christiei*, *Criconemoides xenoplax*, *Paratylenchus hamatus* and *Xiphinema index* were added to rooted cuttings of Thompson seedless vine in 6-inch pots of sterile soil. After five months *T. christiei* had died out and the others had multiplied 60-, 460- and 430-fold, respectively. All three of these were seen to feed on the roots but only *X. index* caused obvious injury, including distortion, swelling, necrosis and destruction of feeder roots.

R.D.W.

(143u) The economic importance and methods of control of the root-knot nematode *Meloidogyne incognita* var. *acrita* on extra-long-staple-cotton are given. Fumigation of the soil with Bromofume, D-D, Nematox and Nemagon gave successful control of the nematode and resulted in increased yields of lint.

H.R.W.

(143v) Citrus roots infested with *Radopholus similis* were placed on the perforated bottom of cylinders 44 in. high and 6 in. in diameter, and covered with 42 in. of soil. Two 600 ml. doses of a 1.5% solution of water-soluble hydrogenated fish oil were sprayed on the soil surface at a 24-hour interval. After 48 hours the roots were removed, washed and incubated in water at 25°-26°C. for 72 hours. The average number of nematodes extracted from the incubation water was 6.8 from treated roots and 132.4 from controls. On staining the roots no nematodes were observed. Small scale field tests on infested young citrus trees gave similar nematode mortality rates. Citrus seedlings of various ages showed no damage when sprayed or drenched with 1% or 1.5% solutions of hydrogenated fish oil at doses of 100-150 ml. each, two or three times at two-week intervals. A pumping sprayer is described intended for soil injection down to 14 feet.

M.T.F.

**144—Plant Pathology. London.**

- a. JONES, F. G. W., 1958.—“Resistance-breaking populations of potato root eelworm.” 7 (1), 24-25.

(144a) Jones tested populations of *Heterodera rostochiensis* from various parts of England, Wales and the Channel Islands, to determine their ability to attack resistant potatoes bred from



*Solanum tuberosum* subsp. *andigena*. Of 20 populations tested in 1956, 14 proved aggressive and six less or not aggressive. Of 25 tested in 1957, 17 were aggressive, breeding readily on the roots of all hybrids tested. *S. vernei* was resistant to all populations tested. R.D.W.

#### 145—Poultry Science.

- a. ALICATA, J. E., 1958.—“Observations on the dosage and method of administration of piperazine citrate to chickens for the control of *Ascaridia galli*.” 37 (1), 89–96.

(145a) Chickens infected experimentally with eggs of *Ascaridia galli* were treated with piperazine citrate at various dose levels given in mash, capsules or drinking water. The eggs were given at the rate of 50 per bird for each of four consecutive days, except for the groups used for observation of drug effect on larval stages when a single dose of 500 eggs was given. Doses of 1,500 to 2,000 mg. per kg. body-weight in gelatin capsules removed 75% or more of 2-day to 17-day larval stages but lower doses were appreciably less effective. Complete elimination of adult worms was obtained with a dose level of 200 mg. per kg. in gelatin capsules or 200–300 mg. per kg. in a small amount of wet mash. A high proportion of worms was eliminated when piperazine citrate was fed at 0.2 to 0.3% in normal ration or as 4 gm. per gallon of drinking water. A concentration of 0.05% in normal ration was only partially effective in preventing infection but whereas a 0.1% prophylactic dose in the feed was about 74% effective this dose level was considered uneconomic. O.D.S.

#### 146—Proceedings of the Alumni Association, Malaya.

- a. AYADURAY, S., 1958.—“A case of subdural haematoma with cysticercosis.” 11 (2), 97–101.
- b. SANDOSHAM, A. A., 1958.—“Helminthic infection in children with special reference to Malaya.” 11 (3), 112–115.

(146b) Sandosham emphasizes the importance of helminthic infections on the health of children and then succinctly reviews the effect thereon of immunity and of sanitary and food habits. Special emphasis is laid on the importance of adequate diet. In Malaya *Ascaris lumbricoides* is the commonest parasite in children. Hookworm infection is also common, 80% of cases being due to *Necator americanus* and the remainder to *Ancylostoma duodenale*. *Enterobius vermicularis* infection is relatively less common than in colder countries. *Hymenolepis nana* occurs in about 2% of children, being commonest in the 5–10 year age group. J.M.W.

#### 147—Proceedings of the Helminthological Society of Washington.

- a. VEGORS, H. H., 1958.—“Observations on inhibited development of cattle nematodes.” 25 (2), 86–90.
- b. VELASQUEZ, C. C., 1958.—“Notes on *Azygia pristipomai* Tubangui, the genus *Azygia* and related genera (Digena: Azygiidae).” 25 (2), 91–94.
- c. RAU, G. J., 1958.—“A new species of sting nematode.” 25 (2), 95–98.
- d. TARSHIS, I. B., 1958.—“A preliminary study of lateral migration by infective larvae of some cattle nematodes on experimentally contaminated forage plots.” 25 (2), 99–106.
- e. SPINDLER, L. A., 1958.—“The occurrence of the intestinal threadworms, *Strongyloides ratti*, in the tissues of rats, following experimental percutaneous infection.” 25 (2), 106–111.
- f. CHITWOOD, M. B. & SMITH, W. N., 1958.—“A redescription of *Anatrichosoma cynamolgi* Smith and Chitwood, 1954.” 25 (2), 112–117.
- g. BURTON, P. R., 1958.—“A review of the taxonomy of the trematode genera *Ascocotyle* (Looss) and *Phagicola* (Faust) of the family Heterophyidae.” 25 (2), 117–122.
- h. CAVENESS, F. E., 1958.—“*Clavaurotylenchus minnesotensis* n.gen., n.sp. (Tylenchinae: Nematoda) from Minnesota.” 25 (2), 122–124.
- i. RASKI, D. J., 1958.—“Four new species of *Hemicyclophora* de Man, 1921, with further observations on *H. brevis* Thorne, 1955 (Nematoda: Criconeematidae).” 25 (2), 125–131.
- j. STEWART, T. B., 1958.—“Resistance of cattle to infection with *Cooperia punctata*.” 25 (2), 131–132.
- k. LORDELLO, L. G. E. & ZAMITH, A. P. L., 1958.—“On the morphology of the coffee root-knot nematode, *Meloidogyne exigua* Goeldi, 1887.” 25 (2), 133–137.

- l. COIL, W. H., 1958.—"Alkaline phosphatase in the trematode excretory system." 25 (2), 137-138.
- m. RASKI, D. J., 1958.—"Nomenclatorial notes on the genus *Criconemoides* (Nematoda: Criconematidae) with a key to the species." 25 (2), 139-142.

(147a) Vegors reports observations made during the late spring in two successive years. In each series four yearling Hereford cattle were taken from a large group on pasture, kept in a barn and fed hay or hay and grain for 28 days; at the end of this time they were killed and examined for gastro-intestinal helminths. Two or three comparable cattle were killed at the time the test animals were removed from the pasture and served as controls. The results are tabulated and discussed. The data indicate that a high proportion of the nematodes persisted, as larvae, for the 28 days after the animals had been removed from pasture and that of these larvae most were *Ostertagia ostertagi*. A few larvae of *Cooperia* spp. were also present but those of *Trichostrongylus axei* did not appear to remain in an arrested stage of development. S.W.

(147b) Velasquez amplifies Tubangui's description of *Azygia pristipomai*, the type specimen of which was destroyed during World War II, and designates topotypes. Her material was collected from *Therapon argenteus* and a fresh-water fish commonly called "ayungin (Tagalog)". The extent of the vitellaria and the relative positions of the genital organs were variable and an oesophagus, receptaculum seminis uterinum and ootype were discernible. From an examination of the type specimen of *Eurostomum micropteri* MacCallum, 1921 and the description of *Gomtiotrema attu* Gupta, 1953 Velasquez concludes that both these are cogenetic with *Azygia*. S.W.

(147c) Rau describes and figures *Belonolaimus longicaudatus* n.sp. The female is distinguished from *B. gracilis* by the longer tail, shorter spear and position of phasmids. It was found associated with the roots of *Zea mays* and of 29 other named plants in Florida. J.B.G.

(147d) Tarshis prepared green-house plots of second year fescue (*Festuca arundinacea*), crimson clover (*Trifolium incarnatum*) on Bermuda sod (*Cynodon dactylon*), and temporary forage (mainly *Avena sativa*), contaminated them with infective larvae of *Cooperia punctata*, *Trichostrongylus axei*, *Ostertagia ostertagi* and *Haemonchus* and studied the lateral migration at intervals of 24, 48 and 72 hours; larvae migrated as much as 16 inches in 24 hours on second year fescue, 12 inches in 48 hours on crimson clover and 8 inches in 24 hours on temporary forage. In outdoor experiments uncontaminated field forage plots (of the same plants as in the green-house series) were contaminated with larvae of *Cooperia punctata* only and in these none migrated laterally more than 8 inches. S.W.

(147e) Spindler infected albino rats with *Strongyloides ratti* and studied the distribution of migrating larvae in the tissues, the number of larvae which could be recovered from the tissues, and the number of adult and pre-adult worms in the intestine at daily intervals up to 13 days after infection. Larvae were recovered from the carcasses 24 hours after infection, the greater number from the posterior parts of the body; some were found in the lungs. From the third day onwards the greater number of migrating larvae occurred in the anterior portions of the body. The maximum number was found in the lungs on the sixth day. Larvae were recovered in greatest numbers from the heart muscles and liver of animals killed from the fourth to seventh days after infection, with the maximum number in the heart muscles on the sixth day. From the second to the sixth day larvae were recovered from the skin. Some larvae were recovered from the tissues 13 days after infection. The maximum numbers of adult and pre-adult worms were found in the intestine nine days after infection and one living, sexually mature female was found in the lung on the 13th day. Larvae were recovered from the gonads on numerous occasions. Only a small proportion of the larvae administered was recovered in most cases. S.W.

(147f) *Anatrichosoma cynamolgi* Smith & Chitwood, 1954 from the nasal passages of *Macaca philippinensis*, originally described in an author's abstract [for abstract see Helm. Abs., 23, No. 274], is fully redescribed. *Trichosoma cutaneum* Swift, Boots & Miller, 1922 is



referred to *Anatrichosoma* as a new combination and is considered distinct from *A. cynamolgi*, the type and only other species of the genus, in being larger with smaller eggs, having fewer stichocytes and in the form of the post-oesophageal swelling and the vulva. The genus *Anatrichosoma* and the subfamily Anatrichosomatinae are diagnosed. W.G.I.

(147g) Burton discusses the morphology of the species of *Ascocotyle* and *Phagicola* and finds that of the four characters upon which Price based their separation, only the extent of the vitellaria divides the two groups. In *Ascocotyle* the vitellaria extend in front of the ovary whereas in *Phagicola* they are restricted to the post-ovarial region. Although it would appear justifiable to unite them in one genus, Burton considers that this might, at present, lead to even greater confusion. Keys to the species of both genera are given. S.W.

(147h) Caveness describes and figures *Clavaurotylenchus minnesotensis* n.g., n.sp. from about the roots of sugar-beet. The head is not offset and continues the body contour; the spear is delicate; the lateral fields have four incisures; the phasmids are situated about the middle of the tail. Vulva 58%, ovary single, prodelphic outstretched; a spermatheca is present; there is a short post-vulval sac. The female tail is slightly clavate and the male tail is conoid with the bursa enveloping the tail; the spicules and gubernaculum are tylenchoid. [This appears to be identical with *Trophurus* Loof, 1956, for abstract see Helm. Abs., 25, No. 547b, and is accepted as such by the author (in litt.).] J.B.G.

(147i) Raski describes and figures *Hemicycliophora epicharis* n.sp. (male and female), *H. vidua* n.sp. (female), *H. hesperis* n.sp. (female) and *H. arenaria* n.sp. (male and female). *H. epicharis* is distinguished from *H. brevis* by the longer spear and single line in the lateral field of the latter; and from *H. typica* (after Thorne, 1955) by the fewer and larger annules, the blunter tail and shorter spear. *H. vidua* differs from *H. gracilis* in the shorter lengths of the females and the absence of two longitudinal lines in the lateral field of the larval cuticle. It differs from *H. similis* in the longer spear and longer part of the body posterior to the vulva. *H. hesperis* is characterized by the distinctly separated annules of the lip region. *H. arenaria* is the only round-tailed species with males. Further data are given about *H. brevis* Thorne, 1955. J.B.G.

(147j) Four Jersey steers (aged 19 to 26 months), which had been on pasture for 11 months and had acquired *Cooperia punctata* infections, were removed from the pasture and kept in a concrete-floored barn. Each was given one million infective larvae of *C. punctata* 24 hours after being housed. Live, ensheathed infective larvae were recovered from the faeces on the first day after their administration but not on any subsequent day. Larvae were recovered from the alimentary tract of the animals killed three, six and nine days after infection but not from the one killed at 12 days. Two-thirds of the larvae from the steer killed at three days were found in the abomasum and were developing normally. This was the only animal from which normally developing larvae were recovered. The results indicate that the acquired resistance was inhibitory to the exsheathing and further development of the larvae and also prevented the larvae from passing from the abomasum into the small intestine. S.W.

(147k) *Meloidogyne exigua*, which was found abundantly in roots of coffee trees in Ribeirao Preto, Brazil, is redescribed because parts of the original description by Goeldi are considered erroneous. Lordello & Zamith found no indication that a first larval moult occurred inside the egg. The perineal pattern of the adult female had a low, slightly flattened arch and poorly defined lateral lines, bordered by folded and broken striae. Males were exceptional in that they lacked the twisted body usually found in the genus *Meloidogyne*. They also occurred as two types, the distance between the opening of the dorsal oesophageal gland and the stylet knobs being about three microns in one and negligible in the other. C.C.D.

(147l) Coil showed that alkaline phosphatase can be demonstrated, by histochemical methods, in the region of the flame cells of gorgoderid cercariae. W.P.R.

(147m) Raski proposes the following nomenclatural changes: *Criconemoides ornatum* nom.nov. for *C. cylindricum* Raski, 1952 nec Kiryanova, 1948; *C. cylindricum* (Kiryanova, 1948) n.comb.; *C. anura* (Kiryanova, 1948) n.comb.; *C. quadricorne* (Kiryanova, 1948) n.comb.; *C. beljaevae* (Kiryanova, 1948) n.comb.; *C. tulaganovi* (Kiryanova, 1948) n.comb.; *C. pullum* (Kiryanova, 1948) n.comb.; and *C. tenuicute* (Kiryanova, 1948) n.comb. All the foregoing are removed from *Criconema*. *Criconemoides zavadskii* (Tulaganov, 1941) n.comb. is removed from *Hoplolaimus*. A key to 30 species of *Criconemoides* is given. J.B.G.

#### 148—Proceedings of the Royal Society of Medicine.

- a. JARRETT, W. F. H., JENNINGS, F. W., MCINTYRE, W. I. M., MULLIGAN, W. & URQUHART, G. M., 1958.—“Irradiated helminth larvae in vaccination.” 51 (9), 743-744.

(148a) Jarrett & his co-workers describe the development of their *Dictyocaulus viviparus* vaccine. This vaccine, which consists of living irradiated *Dictyocaulus* larvae, is given orally and protects calves from infection. It is thought that the presence of the metabolic products of living worms is essential to establish a high level of immunity. Irradiation of the larvae prevents them from completing their life-cycle within the host but allows them to migrate far enough to exert an antigenic effect. Irradiation is carried out by exposure of the larvae to X-rays or to gamma-rays from cobalt-60. Serological studies using a haemolysis complement fixation test show a rise in antibody titre 25 days after infection, reaching a peak at 100 days. On subsequent infection an anamnestic response takes place reaching a peak 7 to 14 days later. Reports of field trials are given and a marked protection is seen with vaccinated animals. Experimental work on the effectiveness of double vaccination is still being carried out. K.H.

#### 149—Publications of the Seto Marine Biological Laboratory.

- a. YAMAGUTI, S., 1958.—“Studies on the helminth fauna of Japan. Part 52. Trematodes of fishes, XI.” 6 (3), 369-384.

(149a) *Aerobiotrema muraenesocis* n.g., n.sp. is described and figured from two mature specimens found in the air-bladder of *Muraenesox cinereus* and is made type of *Aerobiotrematidae* n.fam.: it is closely related to *Isoparorchis* but is characterized by the demarcation of the main body from the hemispherical posterior end by a circular ridge, by the vitellaria being arranged in grape-like bunches of large follicles and confined to the post-testicular inter-caecal field, and by the presence of numerous side branches running parallel to the caeca on the Y-shaped excretory arms; there is neither receptaculum seminis nor Laurer's canal. *Opecoelus lateolabracis* n.sp., from the small intestine of *Lateolabrax japonicus*, differs from *O. sebastodis* (the most closely related species) in that the marginal appendages of the acetabulum are sharply pointed, the seminal vesicle is not bipartite, the opening of Laurer's canal is submedian and the eggs are smaller. *O. sebastisci* n.sp., from the small intestine of *Sebastiscus marmoratus*, resembles *O. nipponicus* in general body shape but differs from it in the length of the cirrus pouch; Laurer's canal opens dorsal to the ovary and behind the vitelline reservoir. *O. pagrosomi* n.sp., from the small intestine of *Pagrosomus unicolor*, resembles *O. xenistii* very closely but differs from it in the size of the eggs—56-65  $\mu$  by 32-39  $\mu$  in *O. pagrosomi* and 50-59  $\mu$  by 29-34  $\mu$  in *O. xenistii*. *Opegaster cryptocentri* n.sp., described from a single specimen from the small intestine of *Cryptocentrus filifer*, differs from *O. beliyai* and *O. mehrii* in the posterior extent of the seminal vesicle and from *O. synodi* in the larger eggs (63-73  $\mu$  by 34-39  $\mu$  in *O. cryptocentri*, 50-54  $\mu$  by 30-32  $\mu$  in *O. synodi*). *Biovarium lateolabracis* n.sp. is described from a single specimen from the small intestine of *Lateolabrax japonicus*; it differs from *B. cryptocotyle*, the genotype, in the more extensive development of the vitellaria in the fore-body and the division of the ovary into two groups of lobes, and by the absence of a genitoacetabular pocket: certain details of the morphology of *B. cryptocotyle* are redescribed



and the generic diagnosis is emended. *Diplopharyngotrema lateolabracis* n.g., n.sp., described and figured from one entire and one damaged specimen collected from the small intestine of *L. japonicus* is made type of Diplopharyngotrematinae, a new subfamily of Cryptogonimidae: prepharynx and pharynx are present, the latter being divided into two parts, each with a different structure. *Pseudosiphoderoides hapalogenyos* n.g., n.sp., from the small intestine of *Hapalogenys* sp., differs from *Siphoderoides* in having a cuticle without spines and a sinuous tubular seminal vesicle, and in that the testes lie dorsal to the caeca and the vitellaria extend largely dorsal and lateral to the caeca, and from *Paracryptogonimus* in the absence of eye spots, body spines and circum-oral spines. *Prosorhynchus crucibulum japonicum* n.subsp. from *Conger myriaster* is distinguished from *P. crucibulum* by the position of the shell gland. The paper is illustrated by numerous plates. S.W.

### 150—Queensland Agricultural Journal.

- a. STEVENS, M. S., 1958.—“Don't let worms drain your horses' strength.” 84 (8), 485–488.

### 151—Rendiconti. Istituto Superiore di Sanità. Rome.

- a. CORBO, S. & RICCI, M., 1958.—“Accrescimento infantile e parassitismo intestinale.” 21 (2), 120–125. [English, French & German summaries pp. 120–121.]

(151a) Corbo & Ricci examined 196 children ranging in age from 6 to 12 years for intestinal parasites and compared their findings with the results of auxological examination of the children by the method of Correnti (*Riv. Antrop.*, 1949, **37**, 50). They found that children with oxyuriasis and trichuriasis showed little deviation from the auxological standards of healthy children, whereas those suffering from hymenolepiasis or infected with three or more parasites presented the greatest number of undergrown subjects in relation to both age and weight. J.M.W.

### 152—Report of the Rothamsted Experimental Station.

- a. JONES, F. G. W., 1958.—“Nematology Department.” Year 1957, pp. 124–130.

(152a) Programmes of work on research in nematology are given under the following headings: non-cyst-forming and other soil nematodes, root-knot nematodes, cyst-forming nematodes of the genus *Heterodera*, movement and activity of nematodes in soil, special photographic techniques. H.R.W.

### 153—Revista de Agricultura. São Paulo.

- a. LORDELLO, L. G. E. & ZAMITH, A. P. L., 1958.—“Nematódeos atacando cafeeiro no Estado de São Paulo.” 33 (1), 59–62. [English summary pp. 61–62.]

(153a) *Meloidogyne exigua* appears to be a parasite of considerable economic importance in parts of the State of São Paulo, Brazil and in a preliminary survey three varieties of coffee were found heavily attacked. Root galls produced by this nematode are rather small and necrosis is often found on diseased roots. C.C.D.

### 154—Revista Kuba de Medicina Tropical y Parasitología.

- a. BOTERO, D., 1958.—“Colombia: encuesta sobre parasitosis intestinal (1957). Encuesta sobre parasitosis intestinal realizada en pacientes adultos del Hospital de San Vicente de Paul, Medellín, Colombia (1957).” 14 (1/6), 31.

**155—Revista Latinoamericana de Microbiología. Mexico.**

- a. RODRÍGUEZ M., J. D., 1958.—“El recuento de huevos de uncinarias. Algunos datos obtenidos en Guayaquil.” **1** (2), 159–166. [English summary pp. 165–166.]

(155a) Rodríguez calls attention to the epidemiological necessity of assessing intensity of infection by faecal egg counts when investigating the incidence of hookworm infection. Using Stoll's dilution count technique he determined the egg count in 150 faecal specimens from the same number of patients in Guayaquil City. According to the number of eggs per gramme the results were classed as very low (200–599), low (600–2,499), moderate (2,600–12,599), high (12,600–24,999) and very high (over 25,000). The two last named degrees were rare. He concludes that all his cases originated in rural areas and that intensity of infection diminishes proportionately to length of city residence. The highest incidence was recorded in children and in the 21–30 year age group.

J.M.W.

**156—Rice Institute Pamphlet. Houston, Texas.**

- a. CHANDLER, A. C., 1958.—“Introductory remarks.” [Symposium on resistance and immunity in parasitic infections.] **45** (1), 4–8.  
b. READ, C. P., 1958.—“Status of behavioral and physiological ‘resistance’.” **45** (1), 36–54.  
c. LEWERT, R. M., 1958.—“Invasiveness of helminth larvae.” **45** (1), 97–113.  
d. OLIVER-GONZALEZ, J. & KOPPISCH, E., 1958.—“Immunological and pathological phenomena related to substances from tissues of *Ascaris lumbricoides*.” **45** (1), 141–150.  
e. KAGAN, I. G., 1958.—“Contributions to the immunology and serology of schistosomiasis.” **45** (1), 151–183.  
f. STOLL, N. R., 1958.—“The induction of self-cure and protection, with special reference to experimental vaccination against *Haemonchus*.” **45** (1), 184–208.

(156b) Read mentions the importance of urea in the metabolism of certain elasmobranch fishes, a high concentration serving possibly as a barrier to invasion by certain digenetic trematodes. He discusses the physiology of encystment of cercariae of *Himasthla quissetensis* and the excystment of some nematode larvae, and points out the effect of carbohydrates on the biology of cestodes. The chemotropic responses of symbionts to their hosts are sometimes sufficiently specific to account for the observed host distribution.

W.K.D.

(156c) Lewert emphasizes that our knowledge of host reaction to the invasion mechanisms of helminth larvae is slight. A polysaccharide-containing protein may help penetration of various tissues either by localizing the enzyme action or protecting against the host's defence mechanisms. The effects of the enzyme resemble the collagenase-containing toxin of *Clostridium welchii*. Lewert suggests that collagenase-like enzymes may also be present in the adult or tissue-developing stages of *Dracunculus*, *Loa* and *Onchocerca* spp. One of the host substances—a glycoprotein—is important in parasite resistance. The inhibition of collagenase is not an antibody phenomenon, and the penetration enzymes are not present at all stages of growth and development of the parasite.

W.K.D.

(156d) Oliver-Gonzalez & Koppisch give details of experiments with the intravenous inoculation of extracts of *Ascaris lumbricoides* var. *suís* into dogs, guinea-pigs and mice. All dogs given more than a certain dose died with anaphylactoid symptoms but animals receiving less than one minimum lethal dose became resistant to further inoculations. Guinea-pigs and mice were unaffected and even after previous *Ascaris* infection showed no anaphylactoid symptoms. The *Ascaris* extract is not a true entity and is related to the A<sub>2</sub> agglutinin in human red cells.

W.K.D.

(156e) Kagan emphasizes the importance of schistosomiasis to the human race, and gives a comprehensive review of the immunology and serology of the disease. Human schistosomes are now found not to be host specific, and the cercaricidal factor of normal serum seems to be associated with the properdin level. The complement fixation test still remains the most sensitive in early schistosomiasis. Skin tests are more often positive using miracidial antigen than using egg antigen. Schistosome immunology has an antigen-antibody basis and an active infection may be necessary to maintain and stimulate immunity.

W.K.D.



(156f) Under certain conditions sheep infected with *Haemonchus contortus* cured themselves and were protected against reinfection. In an experimental infection nine sheep and one calf were vaccinated both by the intra-peritoneal and subcutaneous routes with bacteria-free third-stage larvae. Subsequent challenge with large numbers of larvae showed that effective protection had been achieved. Stoll concludes that vaccination against *Haemonchus* by live non-wandering larvae appears capable of increasing the host's response to the presence of the parasite both in sheep and bovines, and this idea should be further explored for anti-helminth vaccination. *Haemonchus* of sheep origin may be infective for bovines though less so than for sheep.

W.K.D.

### 157—Rivista di Parassitologia.

- a. RICCI, M., 1958.—“Notizie sul parassitismo intestinale dell'uomo nel territorio del Parco Nazionale d'Abruzzo.” **19** (2), 91-112. [English summary p. 112.]
- b. SOBRERO, R., 1958.—“Alterazioni del fegato nella schistosomiasi dei bovini somali.” **19** (2), 113-116. [English summary p. 116.]
- c. LAGRANGE, E., 1958.—“Infections à *Schistosoma mansoni* chez la souris infestée par les cercaires d'un seul planorbe infesté lui-même par un seul miracidium.” **19** (3), 183-186. [English & Italian summaries p. 186.]
- d. RICCI, M. & CORBO, S., 1958.—“Parassitismo intestinale e posizione auxologica del bambino. (Nota I).” **19** (3), 187-208. [English summary p. 208.]

(157a) In various localities within the National Park of Abruzzo, Italy, *Enterobius vermicularis* was found in 32.47% of 653 children examined by Graham's technique; faecal examinations of 237 children aged one to twelve years revealed infections with *Ascaris lumbricoides* in 40.08% and *Trichuris trichiura* in 42.19%. Among 216 persons over 12 years of age the incidences of intestinal helminths were *Hymenolepis nana* 0.46%, *A. lumbricoides* 16.67% and *T. trichiura* 43.98%.

M.MCK.

(157b) In bovines infected with *Schistosoma bovis* in Somalia two types of sclerosis are observed in the liver, a “nodular” sclerosis around the eggs, similar to that observed in human cases of *S. mansoni* and *S. japonicum*, and a “knotted” sclerosis, described here for the first time, which is seen around the adult worm as a series of concentric capsules reminiscent of an onion. This “knotted” sclerosis is occasionally observed even when adults cannot be found. Both types of sclerosis are illustrated.

M.MCK.

(157c) Lagrange used eleven specimens of *Planorbis glabratus*, each infected with a single miracidium of *Schistosoma mansoni*, to infect 20 mice, each with cercariae from a single snail. Three mice died prematurely. The remainder were autopsied after an appropriate interval and it was found that: (i) The cercariae from four snails produced infection with female worms only in five of the mice. (ii) The cercariae from six other snails produced infection with male worms only in 12 of the mice. (iii) The cercariae from the remaining snail produced infection with female worms only in two of the mice and a predominantly female infection together with a single mating couple in the remaining mouse, in which alone eggs were found.

J.M.W.

(157d) Ricci & Corbo compared the height and weight of 1,000 children between the ages of six and 12 years with the results of parasitological examination by means of stool samples and the Scotch tape technique. Using the auxological categories established by De Toni (1954: L'accrescimento umano. La Scuola Ed., Brescia) they were able to demonstrate statistically significant differences between the parasite-free and the parasitized subjects. In the former group individuals of mean and above mean height and weight predominated, while in the latter group individuals of mean and below mean height and weight predominated. Auxopathic subjects were not included in the calculations. The paper is illustrated by numerous scatter-diagrams, graphs and histograms. The helminth parasites found were *Enterobius vermicularis*, *Ascaris lumbricoides*, *Trichuris trichiura* and *Hymenolepis nana*.

J.M.W.

### 158—Sborník Vysoké Školy Zemědělské a Lesnické v Brně. Řada B. Spisy Fakulty Veterinární.

- a. ZAVADIL, R., 1958.—“Nejrozšířenější endoparasité u holubů a účinek piperazin-citrátu na škrkavku holubí.” 6 (1), 87–106. [German & Russian summaries pp. 104–106.]
- b. DYK, V. & ŠTĚDRONSKÝ, E., 1958.—“K poznání helmintů zaživadel pstruha a parmy ve společném životním prostředí.” 6 (1), 107–113. [German & Russian summaries pp. 112–113.]

(158a) Zavadil obtained very good results in treating pigeons infected with *Ascaridia columbae* with piperazine citrate, given as a 1% solution in the drinking water during three days (0.5 gm. of the drug per pigeon per day). Most of the worms were evacuated in the first eight hours after treatment. Zavadil tested the toxicity of piperazine citrate to adult and young pigeons (five days to three weeks old) and found that the doses used for effective treatment were not toxic. C.R.

(158b) The authors record *Sterliadochona ssavina* and *Raphidascaris acus* in *Salmo trutta* m. *fario*, and *Proteocephalus torulosus*, *Rhabdochona denudata* and *Neochinorhynchus rutili* in *Barbus barbus*. There does not seem to be any exchange of helminths between these fishes although they live in the same ecological conditions in the waters examined. C.R.

### 159—Scottish Agriculture.

- a. GRAINGER, J., 1958.—“Chemical control of eelworm diseases.” 38 (2), 93–98.

(159a) In this review Grainger refers principally to the control of potato-root eelworm (*Heterodera rostochiensis*) in the West of Scotland. Of volatile materials, D-D has proved economic on the first early Epicure crop, but even with annual applications it has not given complete control of the eelworm and it is ineffective on silts and highly organic soils. In glass-houses it is effective against root-knot eelworm of tomatoes, but against *H. rostochiensis* the results are variable. EDB, Nemagon and chloropicrin are unsuitable for various reasons. Mercury compounds, if applied as a fine dust and very intimately mixed with the top nine inches of soil, are promising and a suitable machine for the purpose has been made, but the economic aspect of the treatment has not yet been worked out. Light infestations of *Ditylenchus dipsaci* on oats may be economically controlled by spraying the soil with mercuric chloride solution after sowing. A combination of D-D and solublized xyleneol was more effective against root-knot and potato-root eelworms on tomatoes under glass than either chemical alone. The author feels that the present prospects for the control of eelworm diseases can be regarded with modest confidence. M.T.F.

### 160—Special Bulletin. Ministry of Agriculture, Israel.

- a. MINZ, G., 1958.—“Root-knot nematodes, *Meloidogyne* spp. in Israel.” No. 12, 10 pp.

(160a) Minz gives a list of the host plants of *Meloidogyne* spp. found in Israel up to the end of 1957. This list supersedes all previously published ones and includes over 40 new host records. A new type of *Meloidogyne javanica* was encountered and is similar to *M. javanica bauruensis* Lordello. It was found on the following plants: *Celosia cristata*, *Cochlearia armoracia*, *Dalbergia sissoo*, *Dianthus caryophyllus*, *Helianthus annuus* and *Salix* sp. D.J.H.

### 161—Sveriges Utsädesförenings Tidskrift.

- a. BINGEFORS, S. B., 1958.—“Svalöfs Ulva tetraploid rödklöver. Erfarenheter från försök och odling i Mellansverige.” Year 1958, No. 1/2, pp. 7–32. [English summary pp. 29–31.]

(161a) In the course of a description of the merits of a new tetraploid red clover Ulva, mention is made that much of the increase in yield as compared with Ultuna is due to the improved resistance of the variety to stem nematode. J.B.G.



**162—Tijdschrift voor Diergeneeskunde.**

- a. JANSEN, Jr., J., 1958.—“*Spiculocaulus ammonis* n.sp., lungworm of the argali (*Ovis ammon* L.).” **83** (4), 145–150. [Dutch, French & German summaries p. 150.]
- b. JANSEN, Jr., J., 1958.—“Een menginfectie van twee *Capillaria*-soorten bij een duif.” **83** (14), 614–616. [English, French & German summaries p. 616.]

(162a) Jansen describes a new lungworm isolated from the bronchi of an argali sheep (*Ovis ammon*). It is proposed to name this new species *Spiculocaulus ammonis*. A detailed anatomical description of this lungworm is given. It differs from the species of *Spiculocaulus* already described in having a shorter tail and a more pronounced posterior vulva lip in the female, and in the outline of the dorsal ray with its five papillae and the deeply notched bursa in the male. This new species resembles *S. leuckarti* in having a well pigmented corpus gubernaculi, a characteristic absent in the other species of this genus. K.H.

(162b) Jansen found two species of *Capillaria* in the intestine of a domestic pigeon, namely, *C. obsignata* and *C. caudinflata*. This is believed to be not only the first report of the latter species from a pigeon in the Netherlands, but also the first record of these two species occurring together in the intestine of this host. J.M.W.

**163—Tijdschrift over Plantenziekten.**

- a. OOSTENBRINK, M., 1958.—“Enige bijzondere aaltjesaantastingen in 1957.” **64** (1), 122.
- b. KUIPER, K., 1958.—“Parasitering van aaltjes door protozoën.” **64** (1), 122–123.
- c. PRUMMEL, W., 1958.—“*Solanum nigrum* L. als waardplant voor het aardappelcystenaaltje, *Heterodera rostochiensis* Wollenw.” **64** (2), 142–143. [English summary p. 143.]
- d. HAGEDORN, D. J., 1958.—“Some observations on diseases of *Pisum sativum* in several European countries in 1957.” **64** (3), 263–268. [Dutch summary pp. 267–268.]
- e. OUDEN, H. DEN, 1958.—“A new method for culturing plants enabling the observation of nematodes on growing roots.” **64** (3), 269–272. [Dutch summary p. 272.]

(163a) Oostenbrink records plants found attacked by eelworms in Holland in 1957 and includes the following new host records: *Heterodera fici* on *Ficus australis*; *H. cacti* on *Echinopsis*, *Lobivia* and *Rebutia* spp.; *Ditylenchus dipsaci* on *Liatris spicata*; *D. destructor* on *Tulipa hageri*, *T. linifolia*, *T. praestans*, *T. pulchella*, *T. saxatalis* and *T. tarda*; *Aphelenchoides subtenuis* on *Crocus vernus*; *Meloidogyne arenaria* on *Cereus strigosus*, *Gardenia jasminoides*, *Gerbera jamesonii hybrida*, *Medinilla* sp., *Sansevieria* sp., *Cyclamen ibericum*, *C. pseudo-ibericum* and *Hoya carnosa*; *Pratylenchus penetrans* on *Liatris spicata*, *Nepeta faassenii* and *Salvia superba*; *Tylenchorhynchus dubius* on *Sedum sieboldii*; *Rotylenchus robustus* on beet and *Freesia* hybrids; *Hemicycliophora typica* on potato and beet and *Gricnemoides* sp. on rape. D.J.H.

(163b) In 1940 Thorne described a protozoan, *Duboscquia penetrans*, which attacked *Pratylenchus pratensis* (later found to be *P. brachyurus*) in the U.S.A. Kuiper reports the observation in Holland of protozoans, which agree with the description of *D. penetrans*, attacking *Pratylenchus pratensis*, *P. penetrans*, *Rotylenchus robustus*, *Hoplolaimus uniformis*, *Tylenchorhynchus dubius* and *Meloidogyne arenaria*. A.M.S.

(163c) On inoculating *Solanum nigrum* from the Netherlands with a Dutch population of *Heterodera rostochiensis*, no adult females developed. With the same eelworm population on *S. nigrum* from Mecklenburg (Germany), a few fully developed cysts were obtained. Using an eelworm population from Mecklenburg on *S. nigrum* from the two sources, no cysts were found on either, although in Mecklenburg the eelworm developed well on the *S. nigrum* from the district. It is suggested that varietal differences may explain the conflicting results in literature concerning the suitability of *S. nigrum* as a host of *H. rostochiensis*. A.M.S.

(163d) In a survey of pea fields in the Netherlands, West Germany, Switzerland, England and Sweden, 12 diseases were found, some of them recorded for the first time in the country concerned. Pea-root eelworm was observed only in two fields in the Netherlands, in

one of which damage was very severe. It is pointed out that the number of fields inspected was very small in each country and no attempt is made to assess relative economic importance of the diseases from this survey.

A.M.S.

(163c) Den Ouden describes a method of growing plant roots in a thin layer of aerated agar in a polythene bag. When the bag has been prepared and sealed, a young seedling is introduced through a small hole at the top of the bag, the shoot being allowed to grow out into the atmosphere while the root grows in the agar film. Nematodes are introduced at suitable places through slits in the polythene, and the slits sealed with Scotch tape. Den Ouden has used the technique in studying *Heterodera rostochiensis*, *Hoplolaimus uniformis* and *Pratylenchus pratensis*, and finds that it has certain advantages, as an observation chamber, over the test-tube, petri dish and glass-walled observation box.

R.D.W.

#### 164—Transactions of the American Microscopical Society.

- a. OSWALD, V. H., 1958.—“Studies on *Rictularia coloradensis* Hall, 1916 (Nematoda: Thelaziidae). I. Larval development in the intermediate host.” **77** (3), 229–240.
- b. PITTS, T. D. & BALL, G. H., 1958.—“A chamber for helminth cultures.” **77** (3), 280–283.
- c. HAUSMAN, S. A., 1958.—“Parasites of the millipede *Spiroboleus marginatus*.” **77** (3), 283–286.
- d. SPARKS, A. K. & THATCHER, V. E., 1958.—“A new species of *Stephanostomum* (Trematoda, Acanthocolpidae) from marine fishes of the northern Gulf of Mexico.” **77** (3), 287–290.
- e. DEWITT, R. M. & SLOAN, W. C., 1958.—“The innate capacity for increase in numbers in the pulmonate snail, *Lymnaea columella*.” **77** (3), 290–294.
- f. CHENG, T. C. & BOGITSH, B. J., 1958.—“The description of *Hymenolepis turdi* n.sp., a parasite of *Turdus migratorius* L., with notes on the systematic validity of rostellar hooks in the species of *Hymenolepis* of passeriform birds.” **77** (3), 295–298.
- g. MARTIN, W. & BANNER, A. H., 1958.—“The effect of poisonous fish upon intestinal parasites.” **77** (3), 304–306.
- h. KRUIDENIER, F. J. & PEEBLES, C. R., 1958.—“*Gongylonema* of rodents: *G. neoplasticum* (redefinition); *G. dipodomys* n.sp.; and *G. peromysci* n.sp.” **77** (3), 307–315.
- i. MICHELSON, E. H., 1958.—“A method for the relaxation and immobilization of pulmonate snails.” **77** (3), 316–319.

(164a) Oswald investigated experimentally the development of the larval stages of *Rictularia coloradensis* from the whitefooted mouse, *Peromyscus leucopus noveboracensis*, in the intermediate host. Normal development occurred in the cockroaches *Blattella germanica*, *Supella supellectilium*, *Parcoblatta pensylvanica* and *P. virginica*, and in the crickets *Acheta assimilis* and *Ceuthophilus* sp. Some development also occurred in the cockroaches *Periplaneta americana* and *Blatta orientalis*, in the ground beetles *Dicaelus sculptulis* and *Chlaenius* sp. and in the meal worm *Tenebrio molitor*; but by the twelfth day of infection the cysts containing the larvae were pigmented and the larvae dead or dying. Eggs hatched in the sow bug *Trachelipus* sp., but development proceeded no further. Larvae were found under natural conditions in *Ceuthophilus* sp., *C. gracilipes*, *Parcoblatta pensylvanica* and *P. virginica*. In *Blattella germanica* hatching takes place in the mid-gut and the first-stage larvae penetrated the epithelium of the hind-gut within 24 hours of infection. The larvae moulted twice while developing within a cyst formed by the tissue of the host gut, the first moult occurring during the seventh or eighth day and the second during the twelfth or thirteenth day at 72°F. to 80°F. Larvae become infective to the definitive host as early as the tenth day of development under laboratory conditions.

J.M.W.

(164b) Pitts & Ball describe and figure a culture chamber for nematode larvae permitting microscopic examination at any time without disturbance or contamination and providing either for periodic changes or for a continuous flow of medium. The chamber consisted of a shallow bowl-shaped pyrex vessel provided with inlet and outlet tubes and adapted for use with the mechanical stage of a compound microscope by attachment with rubber bands to a hollowed out rubber stopper cemented to a large microscope slide.

J.M.W.



(164c) The large southern millipede, *Spirobolus marginatus*, harbours three types of nematodes in the intestine, namely, a species of *Rhabditis*, a species of *Thelastoma*, and *Rhigonema nigrella*. J.M.W.

(164d) Sparks & Thatcher record a new species of *Stephanostomum*, *S. interruptum* n.sp., from *Bairdiella chrysura*, *Micropogon undulatus*, *Cynoscion nebulosus* and *Ocyurus chrysurus* from the Gulf of Mexico. The new species is described and illustrated and is compared with the two most closely related species, *S. cloacum* and *S. elongatum*. It is differentiated from *S. elongatum* by the possession of a single row of oral spines on the ventral side and from *S. cloacum* by size, number of oral spines, location of the vitellaria and position of the testes. S.W.

(164e) *Lymnaea columella* reared in isolation attained a greater size and laid more eggs per snail than did those reared in pairs. The mortality of eggs from self-fertilized snails was lower than that of eggs produced by paired snails where the opportunity existed for self-fertilization. Nevertheless the mean generation-time and therefore the time to double the population was less in pairs than in isolated individuals, owing to the fact that the pairs have a shorter period of development and so begin to reproduce at an earlier age. [These results may be of significance in relation to snail vectors of trematodes in general.] J.M.W.

(164f) *Hymenolepis turdi* n.sp., described and figured by Cheng & Bogitsh from *Turdus migratorius*, resembles most closely *H. microcirrosa* and *H. planestici* from the same host. The new species can be distinguished from these by the morphology of the rostellar hooks; these are larger in *H. turdi* than in either *H. microcirrosa* or *H. planestici* and the curvature is quite different; the blade in *H. turdi* is shorter than the heel, thus differing from *H. planestici*. The lobed condition of the testes also distinguishes the new species from other species parasitic in passeriform birds. S.W.

(164g) Using laboratory rats and cats infected experimentally with known numbers of metacercariae of *Centrocestus formosanus*, Martin & Banner have investigated the possible anthelmintic effect of the poisonous fish, *Lutjanus bohar*. The fish was given either as raw flesh or as an alcoholic extract evaporated upon dog food. No reduction in the trematode infection occurred and both rats and cats harboured unidentified nematodes and cestodes at the end of the experiment. S.W.

(164h) *Gongylonema neoplasticum* is redescribed and its known hosts listed. *G. dipodomys* n.sp. in the oesophageal wall of *Dipodomys m. merriami*, type host, and *D. panamintinus mahavensis*, from California, differs from *G. neoplasticum* in the length of the gubernaculum and buccal cavity, the size of the eggs, the number of genital papillae and in the number and shape of the bosses. *G. peromysci* n.sp. in the mucosa of the cardiac stomach of *Peromyscus maniculatus rufinus*, type host, *P. boylii rowleyi*, *P. e. eremicus*, *P. t. truei* and *Reithrodontomys m. megalotis*, from Arizona, differs from *G. neoplasticum* and *G. problematicum* in a shorter buccal cavity, left spicule and gubernaculum; festooned cervical alae in the female and in the distribution of the bosses and from *G. dipodomys* in the form of the alae, the bosses and in the size of the spicules, gubernaculum and eggs. W.G.I.

(164i) Michelson describes a technique for the relaxation and immobilization of pulmonate snails in order to facilitate injection of chemical agents or micro-organisms. Partial narcotization by immersion of the snail in a 0.5% to 1% solution of urethan (ethyl carbamate) is followed by mechanical extension with a specially designed microretractor, the glass hook of which is inserted into the male genital opening. J.M.W.

**165—Trudi Instituta Zoologii. Akademiya Nauk Kazakhskoi SSR.**

- a. BOEV, S. N., 1958.—[On the natural focal distribution of helminth diseases.] **9**, 3–9. [In Russian.]
- b. BOEV, S. N. & IVERSHINA, E. M., 1958.—[On the distribution and dynamics of intestinal cestode infections of domestic ruminants in Kazakhstan.] **9**, 10–18. [In Russian.]
- c. GVOZDEV, E. V., 1958.—[Wild birds as reservoir hosts for helminths of domestic birds.] **9**, 19–24. [In Russian.]
- d. AGAPOVA, A. I., 1958.—[Peculiarities of the parasite fauna of fish acclimatized in the water reservoirs of Kazakhstan.] **9**, 25–31. [In Russian.]
- e. SIDOROV, E. G., 1958.—[Parasites of fish in the river Nura and the Nurinsk water reservoir.] **9**, 32–41. [In Russian.]
- f. LAVROV, L. I., 1958.—[Dynamics of infection of domestic ruminants with intestinal cestodes in South Kazakhstan.] **9**, 42–68. [In Russian.]
- g. ULYANOV, S. D., 1958.—[The helminth fauna and the degree of distribution of helminths of sheep on the Kastek collective sheep farm in the Alma-Ata region.] **9**, 69–84. [In Russian.]
- h. SOKOLOVA, I. B., 1958.—[Helminth fauna of sheep and goats in the Kyzyl-Orda region.] **9**, 85–91. [In Russian.]
- i. ZAKHRYALOV, Y. N., 1958.—[Helminth fauna of pigs and wild boars in south-eastern Kazakhstan.] **9**, 92–103. [In Russian.]
- j. ZAKHRYALOV, Y. N., 1958.—[Infection of hybrid pigs with helminths in the Taldy-Kurgan region.] **9**, 104–106. [In Russian.]
- k. KADENATSII, A. N., 1958.—[On the helminth fauna of musk-deer (*Moschus moschiferus* L.).] **9**, 107–110. [In Russian.]
- l. BELOKOBILENKO, V. T., 1958.—[Seasonal and age dynamics of nematodes of fowls in the Alma-Ata region.] **9**, 111–116. [In Russian.]
- m. SOKOLOVA, I. B., 1958.—[*Zygoribatula frisiae*—intermediate host of *Moniezia benedeni* in South Kazakhstan.] **9**, 242–243. [In Russian.]

(165a) Boev reviews work done on the focal distribution of helminths in Kazakhstan and suggests the direction which further investigations into helminth infections of man and farm animals should take. G.I.P.

(165c) Gvozdev notes that there are 17 helminth species common to domestic and wild birds in Kazakhstan and discusses wild birds as reservoirs or possible reservoirs of some helminth infections in that area. *Davainea proglottina* is recorded for the first time from Kazakhstan, where it was parasitic in *Alectoris graeca*. G.I.P.

(165e) Sidorov lists, with short notes on hosts and frequency, 25 trematode, five cestode, four nematode and one acanthocephalan species from 261 fish (belonging to 12 species) in the river Nura and the Nurinsk water reservoir. Specimens, probably *Asymphylogora demeli* but with nearly the entire body covered with spines, were found in *Rutilus rutilus aralensis*. G.I.P.

(165f) About one-fifth of the 11,978 slaughtered ruminants examined in South Kazakhstan were infected with cestodes; the species present were *Thysaniezia giardi*, *Moniezia expansa* and *M. benedeni* in goats and cattle and these and *Avitellina centripunctata* in sheep. Lavrov discusses in detail the distribution and age and seasonal dynamics for these infections, illustrating his results by diagrams and graphs, and suggests suitable periods for treatment. G.I.P.

(165h) Material collected in 1950 in the Kyzyl-Orda region consisted of 26 species of helminths from sheep and 12 species from goats of which six, *Avitellina* sp., *Moniezia benedeni*, *Cysticercus tenuicollis*, *Nematodirus oiratianus*, *N. spathiger* and *Marshallagia marshalli* are new for this host in Kazakhstan. Lungworms appeared to be absent in this district. G.I.P.

(165i) The helminths recovered from 730 pigs from farms in the Alma-Ata and Taldy-Kurgan region numbered 23 species, 18 of which were new for this host in Kazakhstan and some were probably occasional parasites. Six wild boars were comparatively lightly infected with seven species. G.I.P.



(165j) The author found no significant difference in the helminth infections of hybrid pigs and of the Large White breed in his examinations of animals on a farm in the Taldy-Kurgan region. G.I.P.

(165k) Nine species of helminths were found on examination of 13 *Moschus moschiferus* living wild in eastern Russia or at the Moscow Zoo, bringing the number of species reported from this host in Russia up to eleven. The fauna of wild musk-deer was poor, the most frequent being *Setaria cabargi*, but the zoo deer had acquired, from other zoo ruminants, species of low host-specificity such as *Trichostrongylus axei*, *T. colubriformis*, *Ostertagia ostertagi*, *Nematodirus filicollis*, *Capillaria bovis* and *Trichuris ovis*. G.I.P.

(165m) Experimental infection of oribatid mites from South Kazakhstan with *Moniezia benedeni* eggs was successful in *Zygoribatula frisiae*, but a repeated infection of 600 mites with eggs of *Thysaniezia giardi* remained negative. G.I.P.

### 166—Veterinariya.

- a. SOROKIN, A. N., ANDRYUSHCHENKO, V. V. & MEREMINSKI, A. I., 1958.—[The influence of calf rearing in pens on the fall of dictyocauliasis.] 35 (5), 57–58. [In Russian.]
- b. ERMOLOVA, E. N., 1958.—[Eradication of coenuriasis on a sheep farm in South Kazakhstan.] 35 (5), 58–60. [In Russian.]
- c. ISMAGILOVA, R. G., 1958.—[Allergic reaction for the diagnosis of coenuriasis in sheep and cattle.] 35 (5), 61–64. [In Russian: English summary p. 64.]
- d. OREKHOV, M. D. & KELOV, D. N., 1958.—[The epizootiology of anoplocephalid infections in sheep and goats.] 35 (5), 65–66. [In Russian.]
- e. SHEVCHENKO, N. K., 1958.—[Control of anoplocephalid infections in sheep and goats under the conditions existing in Uzbekistan.] 35 (5), 67–71. [In Russian.]

(166a) The regular yearly worming of calves against dictyocauliasis having proved ineffective in the Rovenki area, infection-free animals were reared by a method of keeping them in separate pens in the cowshed until 20 days old and then transferring them until the following year into stalls from which they were allowed out for exercise into fenced yards of one to two hectares (per 150 to 170 calves). Special attention was paid to their feeding and treatment proved unnecessary. G.I.P.

(166c) Antigens prepared from *Coenurus* cysts by the Boivin & Mesrobeanu and the Campbell methods were used for the diagnosis of coenuriasis in sheep and cattle. The method of application and some of the results are as recorded by the author in a previous paper [for abstract see Helm. Abs., 24, No. 712g]. The best results were achieved with antigen from the cyst fluid which diagnosed the infection in 100% of animals (although in 14% a group reaction for *Cysticercus* and *Echinococcus* was obtained), while the antigen from scoleces was correct in 97% of sheep and in all 15 calves. The reaction became positive from the 12th day after infection, detected the presence of even single oncospheres and was positive also with passive infections. G.I.P.

(166d) All the five species of Anoplocephalata known for sheep and goats in Russia were present in Turkmenistan. Of 16,687 animals (mainly slaughtered) examined during 1956, 3.5% were infected with *Thysaniezia giardi*, 1.5% with *Moniezia benedeni*, 1.1% with *Avitellina centripunctata*, 0.8% with *M. expansa* and 0.4% with *Stilesia globipunctata*. The animals became infected in spring and particularly in autumn. G.I.P.

(166e) In Uzbekistan, infection of sheep and goats with *Thysaniezia* exceeds that with *Moniezia* and affects up to 60–70% of lambs and 30% of sheep, causing 32% of those ten months old to be underweight. Shevchenko has tested and recommends treatment with 2% copper sulphate solution (which must be chemically pure) given to thirsty animals at a dose of 100–120 ml. for sheep, 80–100 ml. for goats, and 30–40 ml. for kids and lambs of over six months. The efficacy is 90–100%. Two applications separated by a day, although

**166—Veterinariya (cont.)**

- f. NOSIK, A. F., LITVISHKO, N. T. & GOLUBEV, V. M., 1958.—[The epizootiology and control of trichinelliasis.] **35** (5), 72–73. [In Russian.]
- g. MAMEDOV, A. A., 1958.—[Cysticerciasis in zebu cattle.] **35** (5), 73–74. [In Russian: English summary p. 74.]
- h. SARIMSAKOV, F. S., 1958.—[Testing of phenothiazine against *Bunostomum* in sheep.] **35** (5), 75–76. [In Russian.]
- i. PATUNE, Y. Y., 1958.—[Treatment of echinococcosis in dogs.] **35** (5), 78–79. [In Russian.]
- j. SHIRINOV, H. M., 1958.—[Treatment of nematode infections in sheep by free feeding of phenothiazine-salt mixture.] [Abstract.] **35** (5), 80. [In Russian.]
- k. ZUBOV, S. P., 1958.—[The application of an aqueous iodine on a novocain base for the treatment of dictyocauliasis in sheep.] [Abstract.] **35** (5), 80. [In Russian.]
- l. KHARCHENKO, O. N., 1958.—[Application of purified turpentine against tapeworm disease (hymenolepid infection) in domestic ducks.] [Abstract.] **35** (5), 80. [In Russian.]
- m. SHKLYAEV, I. P., SHCHERBATYUK, V. I. & POLYAKOV, N. N., 1958.—[Paris green—an effective anthelmintic against monieziasis in sheep.] [Abstract.] **35** (5), 80. [In Russian.]
- n. KARTAVTSEN, G. I., 1958.—[Application of aviation petrol for *Ascaridia* in fowls.] [Abstract.] **35** (5), 80–81. [In Russian.]

more effective, are cumbersome but should be used for animals in poor condition at doses of 140–180 ml. for adults and 100–120 ml. for young ones. Treatment should be done twice yearly, adults only in late April and all animals in September. G.I.P.

(166g) Of 259 slaughtered zebu examined in Azerbaijan 51 had cysticerciasis, a rate higher than is usual for cattle. The cysticerci were found in the heart of 76.5% of the animals, in the jaw muscles of 54.9%, in the neck muscles of 45.1% and in the tongue of 41.0%. In one young steer all the musculature and internal organs were infected. G.I.P.

(166h) Phenothiazine in doses of 1.5 gm. per kg. body-weight reduced the intensity of *Bunostomum trigonocephalum* infection in four sheep by 73.7% to 99.0% and was non-toxic. Female worms were passed more readily than males. G.I.P.

(166i) Contrary to some Russian literature, Patune found male fern extract to be ineffective against echinococcosis in dogs. Arecoline hydrobromide in doses of 4 mg. of the plant preparation and 5 mg. of the synthetic form per kg. body-weight, intubated as a 0.1% aqueous solution or given as powder or pills in meat balls, and repeated after ten days cured half of the dogs and reduced intensities by 95.88% to 98.12%. The dogs were pre-medicated to prevent vomiting. G.I.P.

(166k) Iodine solution when intubated to sheep with dictyocauliasis often causes irritation of the nerve elements in the tracheal mucosa and to prevent the subsequent coughing up of the anthelmintic Zubov uses a solution of 1 gm. of crystalline iodine, 2 gm. of potassium iodide and 3.75 gm. of novocain in 1,500 ml. of distilled water, at recommended doses. G.I.P.

(166l) Purified turpentine in equal proportion with cod-liver or plant oil at a dose of 1 ml. per kg. body-weight was used against hymenolepid infection in 5,182 ducks with good results. The best prophylactic effect was obtained when birds were treated 15 to 18 days after being allowed on to the pond, with a second application for ducklings 15 to 18 days later and for grown ducks in the autumn. G.I.P.

(166m) Paris green in doses of 0.1 gm. to 0.3 gm. according to age for lambs aged one to twelve months, 0.6 to 0.75 gm. for sheep aged one year and over and 0.67 to 0.85 gm. for those two years and over, was 100% efficient against *Moniezia*, *Thysaniezia* and *Avitellina* infections in 11,672 sheep. Doses of 1 gm. were toxic and of 1.5 gm. lethal to grown sheep. G.I.P.

(166n) Aviation petrol in doses of 1 to 2 ml. for chicks and 3 to 4 ml. for adults was used to treat 5,029 fowls with *Ascaridia* infections. No eggs were found on coprological examination of 25 chicks and 25 adult birds two weeks later, and no worms were present on autopsy. G.I.P.



## 166—Veterinariya (cont.)

- o. GAVEL, I. I., KRESAN, A. S. & GONCHARUK, E. G., 1958.—[Sutaneous application of carbon tetrachloride against fascioliasis in sheep.] [Abstract.] 35 (5), 81. [In Russian.]
- p. SENKOV, A. I., 1958.—[Should fascioliasis in sheep be treated by subcutaneous injection of carbon tetrachloride?] [Abstract.] 35 (5), 81. [In Russian.]
- q. VITUSHINSKI, I. F., 1958.—[On the action of carbon tetrachloride and its methods of application.] [Abstract.] 35 (5), 81–82. [In Russian.]
- r. GRIGORYAN, G. A., 1958.—[Simultaneous application of hexachlorethane and carbon tetrachloride for fascioliasis in sheep.] [Abstract.] 35 (5), 82. [In Russian.]
- s. SHEVTSOV, A. A., 1958.—[Cyathocotylid infection of domestic ducks.] [Abstract.] 35 (5), 82. [In Russian.]
- t. REZVIKH, A. I., 1958.—[Coenurus in the brain of yaks.] [Abstract.] 35 (5), 82. [In Russian.]
- u. NOVIKOVA, M., 1958.—[Occurrence of coenuriasis in cattle.] [Abstract.] 35 (5), 82. [In Russian.]
- v. OPARIN, P. G., 1958.—[Prenatal infection of a lamb with echinococcus.] [Abstract.] 35 (5), 82. [In Russian.]
- w. RIBALTOVSKI, O. V., 1958.—[Occurrence of *Gastrothylax crumenifer* in cattle.] [Abstract.] 35 (5), 82. [In Russian.]
- x. VOROBEV, M. M., 1958.—[New focus of *Opisthorchis* infection.] [Abstract.] 35 (5), 82. [In Russian.]
- y. VOROBEV, A. N., 1958.—[Sodium fluoride against *Ascaridia* in fowls.] [Abstract.] 35 (5), 82–83. [In Russian.]
- z. SHEVTSOV, A. A., 1958.—[Occurrence of ascarids in goats.] [Abstract.] 35 (5), 83. [In Russian.]
- ba. CHERNOV, V. S., 1958.—[Phenothiazine—an effective means of control of helminth infections in sheep and for the increase of their productivity.] [Abstract.] 35 (5), 83. [In Russian.]

(166s) Shevtsov describes the symptoms and pathology in eight ducks which died of *Cyathocotyle* infection in the course of two days on a farm near Kiev. On autopsy of one duck 343 worms were found in the intestine. The infection occurs in Japan and China but this is its first record from Russia. G.I.P.

(166t) This is the first record of coenuriasis in yaks. The infection attacks animals aged six to 18 months and the cysts are localized in the cerebral hemispheres. Wolves infected by *Multiceps* are important carriers of the disease. G.I.P.

(166v) A hydatid cyst measuring 8 cm. × 12 cm. and filled with transparent fluid was found in the left lobe of the liver on autopsy of a lamb which having been normal for five to six hours after birth then deteriorated in condition and died at the end of the first day. The size of the cyst indicates pre-natal infection. G.I.P.

(166w) *Gastrothylax crumenifer* found in the rumen of cattle in the Moscow slaughterhouse, is recorded for the first time for Russia. G.I.P.

(166x) Of 34 young cats from inhabited areas in the Desna basin 18 were infected with one to 90 specimens of *Opisthorchis*. The infection was also present in all examined cyprinid fish and in three persons from places of the established cat infection. G.I.P.

(166y) Forty fowls aged 11 to 12 months and suffering from *Ascaridia* infections were treated as a group with sodium fluoride in doses of 0.2 gm. to 0.8 gm. per bird, given in food after 24 hours' fasting. The most effective (93% chicks cured) and least toxic dose was 0.6 gm. in 15 gm. of food. 0.3 gm. per kg. body-weight administered three times to 270 chicks aged five months cured 81%. A dose of 1.3 gm. per kg. body-weight proved lethal to fowls. G.I.P.

(166z) A kid, on a farm with a pig, showed signs of ascarid infection and on treatment with santonin and calomel passed 15 mature worms which were thought to be pig ascarids. G.I.P.

**166—Veterinariya (cont.)**

- bb. MKRTCHYAN, S. A., 1958.—[Fascioliasis in cattle and sheep cured on a State farm.] [Abstract.] **35** (5), 83. [In Russian.]
- bc. KLEKOVKIN, L. N. & SIPAKOV, V. N., 1958.—[An attempt to eradicate fascioliasis of domestic ruminants in the Mogilev district.] **35** (6), 16–19. [In Russian.]
- bd. DEMIDOVA, N. V., 1958.—[Bunostomum infection in sheep.] **35** (7), 50–55. [In Russian: English summary p. 55.]
- be. VELICHKIN, P. A., 1958.—[An attempt to eradicate strongylate and parascaris infections on stud farms.] **35** (8), 47–49. [In Russian.]
- bf. NIKITIN, V. F., 1958.—[Suitable periods for the treatment of taeniid infections in dogs in the conditions existing in Daghestan A.S.S.R.] **35** (8), 50–54. [In Russian.]

(166bd) In the Moscow, Yaroslavl and Vologda regions 80% to 94% of sheep were infected with *Bunostomum trigonocephalum*. Demidova has studied the development of larvae in the host and in the open at various temperatures under laboratory and field conditions and describes the different larval stages, their periods of development and the symptoms and pathology produced in the host. She maintains that infection of sheep occurs mainly through the skin (85% to 89% of larvae surviving on percutaneous and 12% to 14% on oral infection). Infection is only oral and less severe in goats and does not take in experimental rabbits, guinea-pigs and white mice. The development in sheep lasts 40 to 46 days; the fourth-stage larva produces considerable pathological changes in the lungs indicating that *Bunostomum* infections may be one of the causes of sheep pneumonia. From the seasonal dynamics Demidova suggests that the most suitable time of year for treatment with phenothiazine is during September and October.

G.I.P.

(166be) A complex method of control involving the regular treatment of horses with phenothiazine and carbon tetrachloride, planned change of pasture, good feeding, uncontaminated water troughs, systematic cleaning out of stables and sterilization of manure, successfully eradicated or considerably reduced strongylate and parascaris infections on numerous stud farms in Russia within three years.

G.I.P.

(166bf) In Daghestan, of 388 dogs examined 16.7% to 59.4% were infected with *Taenia hydatigena* and 3.4% to 55.9% with *Echinococcus granulosus* throughout the year, while *Multiceps multiceps* was at a maximum of 15.3% to 17.6% in the autumn-winter period. Nikitin shows that although the prescribed treatment four times a year is sufficient for dogs in towns and villages and should be applied in September, November, January and May, dogs on sheep farms must be wormed every six weeks and the faeces collected and disinfected after the first two dosings, when some mature worms are still passed and may be a source of infection to the sheep.

G.I.P.

**167—Veterinarski Arhiv.**

- a. ŽUKOVIĆ, M. & WIKERHAUSER, T., 1958.—“Prilog poznavanju djelovanja piperazin adipata i piperazin citrata na askaride u pasa i teladi.” **28** (5/6), 150–157. [English & French summaries pp. 155–157.]

(167a) Piperazine adipate and piperazine citrate were tested at dose levels of 100 to 200 mg. per kg. body-weight against ascarids in 70 dogs and 15 calves. A single dose cleared 37 of the 70 dogs; 24 of the remaining 33 dogs were given a second dose and 22 were then cleared. The more heavily infected dogs required the second dose. A single dose of 200 mg. per kg. given to 15 calves was 100% effective. Both piperazine preparations were equally effective. The drugs were given either in capsules, as syrup or (citrate) in milk. Calves given



three times the therapeutic dose (600 mg. per kg.) showed no side effects. The dose of piperazine recommended for dogs is 100 to 200 mg. per kg. weekly for two or three weeks and 200 mg. per kg. single dose for calves. O.D.S.

### 168—Veterinary Medicine.

- a. HERLICH, H. & PORTER, D. A., 1958.—“An anthelmintic for cattle and sheep. Critical tests of efficacy of Bayer 21/199.” **53** (7), 343–348, 360.
- b. DICK, J. R., 1958.—“New lungworm treatment for swine.” **53** (8), 413–415, 455.
- c. COLGLAZIER, M. L., WILKENS, E. H. & ENZIE, F. D., 1958.—“Influence of carob flour on absorption and elimination of phenothiazine.” **53** (8), 416–420, 449.
- d. TEAGUE, H. S., SMITH, H. R. & RUTLEDGE, E. A., 1958.—“Hygromycin B and piperazine phosphate for swine.” **53** (10), 525–530, 554.
- e. SCHAD, G. A., ALLEN, R. W. & SAMSON, K. S., 1958.—“The effect of Dow ET-57 on some sheep parasites.” **53** (10), 533–534, 554.
- f. BECKLUND, W. W. & ALLEN, R. W., 1958.—“Worm parasites of cattle in New Mexico.” **53** (11), 586–590.
- g. GREENBERG, J., SEYMOUR, W. E. & McEWEN, A. F., 1958.—“Effect of varying doses of piperazine citrate on puppies.” **53** (11), 609–610.

(168a) O,O-diethyl O-(3-chloro-4-methyl-7-coumarinyl) phosphorothioate (Bayer 21/199) was tested critically in nine calves and four lambs. All calves and two lambs had natural infections of intestinal helminths while two lambs had been received worm-free and were experimentally infected with *Haemonchus contortus* and *Trichostrongylus colubriformis*. The efficiency of the drug was estimated by counts of worms expelled in the faeces following treatment and those recovered from the gut when the animals were killed four to five days after treatment. In calves the drug was highly efficient against *Cooperia punctata*, *C. pectinata*, *H. placei* and *Oesophagostomum radiatum* at all dose levels, against *Ostertagia ostertagi* at 25 mg. per kg. body-weight, and against *T. axei* at 25 and 12.5 mg. per kg., but it was erratic against *Bunostomum phlebotomum* and *Nematodirus helvetianus*. In sheep the drug was active against *H. contortus*, *O. circumcincta*, *T. axei*, *T. colubriformis*, *C. curticei* and *Strongyloides papillosus* at 25 mg. per kg. but was less effective at 12.5 mg. per kg. against *T. colubriformis* and *S. papillosus*. In pasture tests against lightly infected calves and sheep the egg counts were reduced to nil following treatment. Toxic side effects were diarrhoea, inappetence, lachrymation and salivation of a transitory nature. This drug is considered to be highly promising but in view of its potential toxicity is not recommended for general use without further trials. O.D.S.

(168b) The author describes the results of field trials carried out with Dictyicide (cyanacethydrazide), against lungworm infections in pigs. The drug is remarkably effective and promptly corrects coughing and general unthriftiness in infected animals. It appears to be specific for lungworms and is compatible with other anthelmintics and immunizing agents. K.H.

(168c) In an experiment to substantiate the claim that the addition of carob flour, an intestinal adsorbent, to phenothiazine reduces the absorption of the drug by dairy goats, limited trials were carried out relating to the presence or absence of a pink discoloration of the milk characteristic of phenothiazine therapy. The drug or mixture was given either as a single large therapeutic dose or in small daily doses for ten consecutive days. The milk from all animals developed the characteristic pink discoloration which appeared as promptly, obtained equal intensity and persisted for equal or longer periods in those instances where carob flour was added as it did where phenothiazine alone was given. Carob flour did not appear to offer promise in reducing the absorption of phenothiazine to the point of elimination of the pink discoloration in goats' milk. O.D.S.

(168d) Groups of eight pigs all nine weeks of age and known to be infected with *Ascaris*, *Oesophagostomum* and *Trichuris* were treated continuously with hygromycin B as an additive to the feed, with piperazine phosphate in worming doses and/or in continuous combination with the feed, or with combinations of these methods of treatment. In each of two trials some groups of pigs were maintained on pasture while others were maintained on concrete. Continuous-feed hygromycin was given at 6,000 units per pound of feed, the worming dose of piperazine phosphate was at 12 lb. per ton of feed, and the continuous-feed piperazine phosphate was at 1.2 lb. per ton of feed. On hygromycin B alone the egg counts of all three parasites showed a marked reduction compared with untreated controls when faecal examinations were made between the 42nd and 112th days after treatment began. Worm counts for all three species made in each pig at time of slaughter indicated the decreasing order of effectiveness to be: (i) 6,000 units of hygromycin B per lb. of feed; (ii) this treatment in conjunction with piperazine phosphate as an occasional worming agent; (iii) piperazine phosphate as a worming agent together with continuous feeding at 1.2 lb. per ton; (iv) piperazine phosphate as a worming agent; (v) continuous feeding of piperazine phosphate at 1.2 lb. per ton. Optimum effects of hygromycin B on performance were observed up to 120 lb. live weight but some adverse effect was observed if the treatment was continued beyond this point. O.D.S.

(168e) Dow ET-57 (o,o-dimethyl-o-2,4,5-trichlorophenylphosphorothioate) was used as a drench at 100 mg. per kg. body-weight in aged ewes infected with *Thysanosome*, *Haemonchus*, *Ostertagia*, *Trichostrongylus*, *Nematodirus* and *Chabertia*. Of ten sheep so infected, five were treated and five retained as controls. The faeces of three of the five treated sheep were collected in attached cloth bags for four days after treatment and were examined for worms. All animals were slaughtered on the fourth day after treatment and worm counts made of the contents of the abomasum, small intestine and large intestine. Tapeworm counts were made in all animals and nematode counts in the three under critical examination. Such counts showed that at 100 mg. per kg. Dow ET-57 was ineffective against the tapeworm and against the nematode parasites. O.D.S.

(168f) Post-mortem examinations of five Arizona and six New Mexico cattle revealed nine species of gastro-intestinal nematodes in the former but only four of these species in the latter. These four species were: *Cooperia punctata*, *C. oncophora*, *Nematodirus helvetianus* and *Oesophagostomum radiatum*; and these also had the highest over-all incidence in both groups. The remaining five species were *Haemonchus placei*, *Trichostrongylus axei*, *Ostertagia ostertagi*, *C. pectinata* and *C. mcmasteri*. Examination of faecal samples from 186 cattle from 26 different localities revealed nematode eggs in 65%. Egg counts were low (maximum 400 per gm. of faeces). Total worm count ranged up to an estimated 2,312 per individual animal. *Fasciola* eggs were found only in faecal samples from cattle grazed on mountain range pasture. *Dictyocaulus* larvae were not found. The results are discussed in relation to climate and type of pasture. J.M.W.

(168g) Piperazine citrate was tested as an anthelmintic for ascariasis in 186 dogs and 47 cats. The drug was given in food at 10 gm. per 7 lb. body-weight to 31 adult dogs and puppies and to two cats. Vomiting occurred in ten puppies. The dose was then reduced for treatment of the other animals and was given in doses of 8 gm. per 7 lb., 7 gm. per 5 lb. or 6 gm. per 5 lb. The proportion of dogs that vomited was markedly reduced with the lower dosages. Of 173 dogs (some not infected) only six vomited and this was attributed to nervousness rather than drug effect. Cats were less affected than dogs; young puppies were more sensitive than older dogs. Piperazine citrate was completely effective against ascarids at the 6 gm. per 5 lb. dose. O.D.S.



**169—Veterinary Record.**

- a. GIBSON, T. E., 1958.—“The role of the egg as the infective stage of the nematodes *Nematodirus battus* and *Nematodirus filicollis*.” **70** (24), 496–497.
- b. KINGSBURY, P. A., 1958.—“The effect of particle size on the anthelmintic properties of phenothiazine in sheep.” **70** (26), 523–528.
- c. MICHEL, J. F. & COATES, G. H. D., 1958.—“An experimental outbreak of husk among previously parasitised cattle.” **70** (27), 554–556.
- d. MACKENZIE, A., 1958.—“Studies on lungworm infection of pigs. I. Observations on natural infection.” **70** (42), 843–846.
- e. POYNTER, D., 1958.—“The anthelmintic properties of hygromycin B in horses.” **70** (43), 865–870.

(169a) One of each of three pairs of lambs received 500,000, 150,000 or 100,000 infective larvae which were 88% *Nematodirus battus* and 12% *N. filicollis*, the second of each pair received similar numbers of eggs (containing the third-stage larva and pre-treated to kill any hatched larvae) which were 74% *N. battus* and 26% *N. filicollis*. Faecal egg counts were carried out on the lambs from the day of dosing until autopsy three weeks later. The eggs of *N. battus* were capable of establishing infections, but to a lesser extent than the larvae, while in the case of *N. filicollis* only the larvae were able to produce infections. G.I.P.

(169b) In tests against naturally acquired and artificially produced nematode infections in sheep, the effectiveness of treatment with phenothiazine was related to different particle size in four preparations, viz., (i) 25% greater than  $10\mu$ , (ii) 86% greater than  $10\mu$ , (iii) 74% greater than  $10\mu$ , (iv) 88% less than  $10\mu$ . Against *Trichostrongylus colubriformis* the relative efficiencies expressed as a percentage of control figures were (i) 4% at 550 mg. per kg., 27% at 775 mg. per kg.; (iii) 70% at 500 mg. per kg., 73% at 700 mg. per kg.; (ii) 73% at 550 mg. per kg., 85% at 750 mg. per kg., 80% at 825 mg. per kg.; (iv) 82% at 500 mg. per kg., 72% at 700 mg. per kg. Effectiveness was variable against *Ostertagia* spp. and could offer no clear indication of increased efficiency due to decrease in particle size. Against *Haemonchus contortus* it was concluded that some greater efficiency was obtained with decrease in particle size and that a reasonable proportion of material of less than  $10\mu$  is essential for full effectiveness of phenothiazine at ordinary dose levels. The five preparations showed little or no effect against *Nematodirus* spp., *Strongyloides papillosus*, *Trichuris ovis* or *Dictyocaulus filaria*. The numbers of *T. axei* and *Cooperia curticei* were too small for significant observation but the impression was gained that no greater efficiency was obtained by finer than by coarser preparations. The use of finer particles of phenothiazine did not produce any toxic symptoms. O.D.S.

(169c) The control measures which Michel & Coates advocate for *Dictyocaulus viviparus* in cattle are to permit a first exposure to a low herbage infestation and then for contact with infection to be continuous. They base these recommendations on the observation that cattle, which have had a previous infection and are then removed to conditions where their intake of larvae is negligible, suffer, on re-exposure, outbreaks of equal severity to animals undergoing a first infection. The faecal larval counts of cattle which had received two infections were negative following the second exposure despite the presence of clinical symptoms of the disease. This was considered to be due to a decline in ability to resist establishment of the worms, while ability to prevent development of the worms and to eliminate them from the lungs had persisted over the twelve months between exposures. K.H.

(169d) Mackenzie shows that under natural conditions when pigs have access to a lightly infected pasture a considerable proportion (50% to 70%) could become infected with lungworms. The actual degree of infection was usually mild but the incidence, particularly among pigs of store and pork groups, was high. After exposure to infection the first cases were found at ten weeks which indicates that infection took place at about six weeks, since *Metastrongylus* takes four weeks to reach maturity. A constant infection was maintained until 15 weeks when

a decline in numbers occurred. It is shown that a low grade infection in breeding stock was sufficient to carry an infection over to clean pasture and that the effects of parasitic infection in a herd with a low degree of infection were negligible. K.H.

(169e) Hygromycin B, one of the antibiotics produced by *Streptomyces hygroscopicus*, was given in the feed to ponies and Thoroughbred horses to determine the anthelmintic potency against strongyle infections. Treatment was given in two or three courses for each animal and was carried out daily for a number of weeks in each instance. In four horses weighing approximately 1,000 lb. about 120,000 to 160,000 units of hygromycin B were given in the first course and 160,000 units in the second and third courses. In three ponies weighing about 500 lb. the dose ranged from 60,000 to 80,000 to 160,000 units of hygromycin B, daily for, several weeks. These animals, also, were given two or three courses of treatment. Daily egg counts and larval differentiation were made in each test animal. Strongyle egg counts showed a marked decrease during the second week of treatment and remained depressed whilst the drug was given. Withdrawal of drug usually resulted in an increase in egg counts which fell again when treatment was resumed. Differential counts suggested that a greater anthelmintic effect was obtained against the genus *Trichonema* than *Strongylus* but the evidence obtained was insufficient to determine whether the worms were killed or whether egg laying was only temporarily arrested. O.D.S.

#### 170—Wiadomości Parazytologiczne. Warsaw.

- a. KOZAR, Z., 1958.—“W sprawie zwalczania włośnicy i tasiemców.” 4 (3), 211–218. [English & Russian summaries p. 218.]
- b. GUTTOWA, A., 1958.—“O epidemiologii, stanie badań i walce z difylobotriozą w Związku Radzieckim.” [On the epidemiology, investigation and control of *Diphyllobothrium* infections in the Soviet Union.] 4 (3), 219–227. [English & Russian summaries pp. 226–227.]
- c. PAVLOV, P., 1958.—“Choroby pasożytnicze człowieka i walka z nimi w Chinach.” [Parasitic diseases of man and their control in China.] 4 (3), 229–234.
- d. CZEBOTARIEW, R. S., KUŁAKOWSKA, O. P. & MAJKA, W. I., 1958.—“Rola czynnika pasożytniczego w etiologii morzysk i niektórych innych schorzeń konia.” 4 (4), 309–317. [English & Russian summaries p. 317.]
- e. PROST, M., 1958.—“Roślinne fermenty proteolityczne w leczeniu robaczyc u ludzi i zwierząt.” 4 (4), 323–329. [English summary p. 329.]
- f. STOJAŁOWSKA, W., 1958.—“Zagadnienie profilaktyki w owsicy.” [The prophylaxis of enterobiasis.] 4 (4), 331–336. [English & Russian summaries pp. 335–336.]

(170a) Kozar discusses the present occurrence and the problems and plans of the Ministry of Health for the control and eradication of trichinellosis and taeniasis in Poland. G.I.P.

(170d) The authors have examined post mortem 317 horses which had died with various intestinal complaints (colic, gastro-enteritis etc.). They tabulate the numerical and percentage results of the frequency of the various pathological changes and of helminth infections and conclude that helminths are largely responsible for these diseases. G.I.P.

(170e) The efficacy of nematolyt and vermizym in therapeutic or even larger doses against *Ascaridia galli* in fowls was only 20% to 60%. Prost, tracing the history of the use of proteolytic plant enzymes in worming and analysing the results obtained, concludes that the very high effect shown by these enzymes on helminths *in vitro* is not confirmed in experiments on animals and man. G.I.P.



**171—Wiener Tierärztliche Monatsschrift.**

- a. HALAMA, A. K., 1958.—“Parasitenbekämpfung und antibiotische Futtersupplementierung in der Schweine-Schnellmast.” **45** (1), 25–35. [English, French & Italian summaries p. 35.]
- b. KNIEWALLNER, K., 1958.—“Untersuchungen von Schweinelebern auf das Vorkommen von Echinokokken und *Cysticercus tenuicollis*.” **45** (3), 183–184.
- c. HUBINGER, R., 1958.—“Die Echinokokkenfunde im Schlachthof Graz.” **45** (7), 433–437. [English, French & Italian summaries p. 437.]
- d. SUPPERER, R., 1958.—“Über die in der Aussenwelt ablaufende Entwicklungsphase von *Bunostomum phlebotomum* (Railliet 1900), (Nematoda, Ancylostomidae).” **45** (9), 553–560. [English, French & Italian summaries p. 560.]
- e. LIENERT, E., 1958.—“Nematodenmittel beim Schwein.” **45** (9), 579–589.

(171a) Halama reports on a series of experiments on the effect of anthelmintic treatment and antibiotic supplements on the fattening of pigs. Animals given either gentian violet or aureomycin showed a definite improvement in weight gain and general appearance as compared with controls. Animals given both gentian violet and aureomycin did even better. The economic significance of these results is discussed and further studies are to be undertaken.

A.E.F.

(171b) Kniewallner has examined the livers of 2,444 pigs slaughtered at a Vienna abattoir and only eight of them (0.33%) had hydatid infection. This does not confirm the findings of Niclas, (in *Berl. Münch. tierärztl. Wschr.*, 1957, **70**, 314–315), who found a 4.5% infection with hydatid and *Cysticercus tenuicollis* in 5,000 pigs.

A.E.F.

(171c) Hubinger reports that while the number of pigs killed at the Graz slaughterhouse decreased from 31,463 in 1952 to 26,835 in 1956 the number of pig livers infected with hydatid increased from 598 to 2,228 over the same period. One of the main reasons for this increase is thought to be the ignorance of rural populations as to the important role played by dogs in the spread of the disease. Education of the public and stricter control of dogs are urged.

A.E.F.

(171d) Supperer describes the extracorporeal stages in the development of *Bunostomum phlebotomum*. The surface of the ovum is sticky so that faeces and bacteria are always attached to it. The larvae take in no food during the free-living stage: they exist on the food stored in the ova. Two ecdyses occur during this period and as neither cuticle is discarded the infective larva is provided with two sheaths. The oesophagus has two distinct sections—one glandular and the other muscular: this is so distinctive of *B. phlebotomum* larvae that it enables them to be differentiated without difficulty from other cattle nematodes.

A.E.F.

(171e) Lienert summarizes present knowledge on the treatment of nematode infections of pigs. Since oral administration of drugs to pigs is difficult, emphasis is placed on such substances as piperazine compounds, cadmium compounds, and sodium fluoride which can be mixed with the food. Care however must be taken to ensure that the weaker (and therefore probably more heavily infected animals) get a proper share of the food.

A.E.F.

**172—Zeitschrift für Tropenmedizin und Parasitologie.**

- a. KRAMPITZ, H. E., 1958.—“Über das heutige Sizilien in hygienisch-zoologischer Sicht.” **9** (2), 111–128. [English summary p. 127.]
- b. ATA, A. H. & EL RAZZAK, M. A., 1958.—“Statistical study of hypertension in bilharzial cirrhosis.” **9** (2), 163–167. [German summary p. 167.]

- c. LÄMMLER, G., 1958.—“Die Chemotherapie der Trichuriasis. Untersuchungen an experimentell mit *Trichuris vulpis* infizierten Hunden.” 9 (3), 204–212. [English summary p. 211.]
- d. BUCK, A. A., LIESKE, H. & HAAGE, H., 1958.—“Ein Fall von Paragonimiasis der Niere.” 9 (3), 212–216. [English summary p. 216.]

(172a) In this paper which deals chiefly with the distribution of arthropods of hygienic importance, the publications of various authors are cited for the incidence of helminth infections in Sicily. Boverter (1947/48) recorded *Ascaris* carriers in 23·8% and Ricci found *Enterobius vermicularis* 85·87%. An outbreak of trichinelliasis with 13 deaths was reported by D'Alessandro in 1949.

R.T.L.

(172b) Of 508 patients with liver cirrhosis of schistosome origin in Manial Hospital, Egypt, only 33 (6·5%) had high blood pressure as compared with a much higher incidence observed among Egyptian individuals not selected for liver disease. The present findings thus confirm that hypertension is less likely to occur in patients with liver cirrhosis than in normal individuals.

M.MCK.

(172c) Dogs were infected experimentally with 3,500–10,000 infective eggs of *Trichuris vulpis* and at the end of the prepatent period were treated with Viasept (*p*-glycolamino-phenyl-arsonic bismuth). The drug was given either as tablets or in gelatin capsules. The faeces were examined for adult worms for up to five days after commencement of treatment and follow-up stool examinations were made weekly for four weeks. A total of 35 dogs received treatment. Of eleven dogs treated daily for four days, eight which received 280–358 mg. per kg. were negative for *T. vulpis* ova 28 days after treatment. Of three dogs given 250–270 mg. per kg. over four days, one was cured. No toxic side effects were observed. Lämmler considers that *T. vulpis* is a good screening organism for the search for drugs likely to be effective against *T. trichiura* in man.

O.D.S.

(172d) Buck *et al.* describe a case of paragonimiasis in a 36-year-old male South Korean in which ova were excreted in the urine and the right kidney and its ureter were localized as the focus of infection. After treatment with Resochin (a total of 60·25 gm. in doses of 0·75 gm. per day) both urine and sputum were negative for ova.

A.E.F.

### 173—Zhivotni Mir SSSR.

- a. KIRYANOVA, E. S., 1958.—[VI. Vermes. Roundworms—plant-parasitic and soil nematodes.] 5, 137–142. [In Russian.]
- b. KIRYANOVA, E. S., 1958.—[VII. Vermes. Roundworms—plant-parasitic and soil nematodes.] 5, 477–485. [In Russian.]

(173a) A collection of plant and soil nematodes was made in 1934–35 in the Crimea. The frequency of the nematodes (which occurred in the topmost 10 cm. in virgin soil and 10–30 cm. deep in cultivated fields) is tabulated for different types of locality and their specific composition is briefly discussed. Species of Tylenchida predominated in grassland, *Acrobeles ciliatus* and *Pratylenchus obtusus* in an area planted with *Juniperus*, while in beech and pine woods on a mountain slope species of *Dorylaimus* and *Tylencholaimus* were found. Accompanying illustrations include *Criconemoides cylindricum* and the rare *Criconema zernovi*.

G.I.P.

(173b) Kiryanova gives an outline of the plant and soil nematodes in the Caucasus based on her own investigations and on collections by other authors made between 1931 and 1940. Tylenchidae, Criconematidae and Dorylaimoidea are frequent and specifically well represented; Mononchidae are somewhat less so. *Tylenchulus semi-penetrans*, being assumed harmless, is widely distributed on various citrus trees. The nematodes found in a deciduous wood and in a *Triticum persicum* field in Georgia are listed.

G.I.P.



## 174—Zoologicheskii Zhurnal.

- a. PARAMONOV, A. A., 1958.—[The principal trends of the evolution of plant eelworms belonging to the orders Rhabditida and Tylenchida.] 37 (5), 736–749. [In Russian: English summary pp. 748–749.]
- b. SU, D. L., 1958.—[Responses of the mollusc *Oncomelania hupensis* to light.] 37 (6), 832–837. [In Russian: English summary p. 837.]
- c. POLOZHENTSEV, P. A. & ARTYUKHOVSKI, A. K., 1958.—[New mermithid species.] 37 (7), 997–1005. [In Russian: English summary pp. 1004–1005.]
- d. ROMANOV, I. V., 1958.—[Distribution of echinococcosis in wild foxes in Krasnoyarsk territory.] 37 (8), 1136–1142. [In Russian: English summary p. 1142.]
- e. SU, D. L., 1958.—[The effect of the temperature factor on the activity of *Oncomelania hupensis*.] 37 (9), 1316–1324. [In Russian: English summary pp. 1323–1324.]

(174a) In an attempt to analyse their phylogeny Paramonov discusses the principal trends in the evolution of plant-parasitic Rhabditida and Tylenchida, and the associated morphological changes. The suborder Rhabditata, adapted mainly to saprobic media, is the group of origin of the Diplogasterata which have evolved towards a predatory life and partial emancipation from the saprobic medium, and of the Cephalobata which have evolved towards a life in soil and in plant tissue. Two ecological groups are recognized in the Tylenchida, namely, (i) eelworms of specific pathogenic effect, able to break down proteins and polysaccharides, with an antagonistic relation to saprobionts, and (ii) eelworms of unspecific pathogenic effect, with the opposite characters and always poor in genera. In the Aphelenchoidea, the Aphelenchidae are represented by the second group alone, the Aphelenchoididae also by some of the first group. In the Tylenchoidea, the Tylenchidae contain worms of both groups, the Neotylenchidae those of non-specific and the Heteroderidae only those of specific pathogenic effect. It is suggested that the Tylenchida first entered plants following the fungal mycelium on which they had been feeding. G.I.P.

(174b) Su has shown experimentally that *Oncomelania hupensis* is positively phototactic and prefers brighter light (28 lux) to very weak light (0.1 lux), but avoids direct sunlight. It moves more rapidly in moderately bright light than in darkness or strong light, the optimum conditions of illumination being in the region of 3,600 to 3,800 lux. Eradication of grass on river banks and ramming of soil create unfavourable conditions for its existence aiding control. G.I.P.

(174c) Polozhentsev & Artyukhovski describe three new species: *Complexomermis gilarovi* n.sp. from the Voroshilovgrad region, *Hexamermis kirjanovae* n.sp. from the vicinity of Voronezh and *Filipjevimermis paramonovi* n.g., n.sp. from the vicinity of Voronezh. *C. gilarovi* differs from *C. elegans* in being longer, males 45–64 mm. and females 83–127 mm., in the spicular structure, the number of genital papillae and in lacking cervical papillae. *H. kirjanovae* differs from other species of the genus in the form of the cuticular striations and the absence of rosette cells from the anterior end of the body. *Filipjevimermis* differs from *Hexamermis* in lacking crossed fibres in the cuticle and from *Psammomermis* in having an S-shaped vagina. Two species, *F. tenuis* (Hagmeier, 1912) and *F. racovitzai* (Coman, 1953) are included in the new genus as new combinations. W.G.I.

(174d) In the Krasnoyarsk territory of Siberia, 55.9% (70% in some areas) of wild foxes examined were infected with *Echinococcus multilocularis*, the intensities usually reaching up to several thousand worms per animal. The steppe and forest steppe regions were more affected than the taiga regions. Foxes became infected during summer; in the autumn-winter period only mature worms were found and the infections gradually fell towards early spring. G.I.P.

(174e) In the laboratory the optimal temperature for *Oncomelania hupensis* activity was 13°C. Their rate of locomotion increased with temperature but at 33°C. they became fatigued rapidly. In air the molluscs were killed by –9°C. within a few hours, when kept in a little water they died at –2°C. to –3°C. after two hours. In river experiments near Lake Tai, the

molluscs survived at a depth of 3 m. for 110 days in the winter (duration of experiment) but died within 12 days (apparently from oxygen deficiency) in the summer, when shallower waters were more favourable. Su concludes that removal of grasses (which afford shelter) from river banks aids control of molluscs throughout the year but that application of chemical and mechanical measures during the winter is useless. G.I.P.

## NON-PERIODICAL LITERATURE

175—BARGER, E. H., CARD, L. E. & POMEROY, B. S., 1958.—“Diseases and parasites of poultry.” London: Henry Kimpton, 5th edit., 408 pp.

176—JANSEN, J., 1958.—“Lebmaagtrichostrongylden bij Nederlandse herten.” Thesis, Utrecht, 100 pp. [English summary pp. 88–91.]

Jansen has examined for trichostrongylids the abomasa of 68 *Capreolus capreolus*, 86 *Cervus elaphus* and 14 *Dama dama* from various parts of the Netherlands. This led first to a revision of the Trichostrongylinae: Jansen concludes that the division of this subfamily by Skryabin *et al.* into four “tribes” is not practicable and he proposes that it should consist of 21 genera for which he gives a key and a list of species. Changes proposed are: *Apteragia* n.g. for *A. quadrispiculata* n.sp. (from *Dama dama*) and *Ostertagia hamata*; *Bigalkea neveulemairei* n.comb. for *O. neveulemairei*; *Grosspiculagia kolchida* n.comb. for *O. kolchida*; *G. podjapolskyi* n.comb. for *Mufionagia podjapolskyi*; *Hyostrongylus* is transferred from Cooperiinae to Trichostrongylinae and *H. okapiae* n.comb. for *O. okapiae*; *Longistrongylus muraschkinzevi* n.comb. for *O. (Costarcuata) muraschkinzevi*, the subgenus being reduced to the synonymy of *Longistrongylus*; *Mazamastrongylus alcis* n.comb. for *Spiculopteragia alcis*; *Ostertagia capreolagi* nom.nov. for *Capreolagia skrjabini*; *Rinadia mathevossiani* n.comb. for *Spiculopteragia mathevossiani*; *Spiculopteroides* n.g. for *Skrjabinagia odocoilei* and *S. dagestana*; *Ostertagia (Grosspiculagia)* to generic rank; *Trichostrongylus andreevi* reduced to the synonymy of *T. capricola*. A total of 16 species was recovered from the deer and all are described and figured: *Rinadia* is redefined. New host records are: *T. retortaeformis* and *T. capricola* in roe deer; *T. axei* in fallow deer; *Apteragia quadrispiculata* in all three species; *Ostertagia ostertagi* in fallow deer; *O. leptospicularis* in fallow and red deer; *O. circumcincta* in fallow deer; *O. mossi* in red and fallow deer; *O. trifurcata* in fallow deer; *Grosspiculagia lasensis* in red and fallow deer; *Spiculopteragia spiculoptera* and *S. asymmetrica* in red deer; *Rinadia mathevossiani* in red and fallow deer; *Teladorsagia davtianii* in fallow deer. The commonest species in roe deer were *Trichostrongylus axei*, *Ostertagia leptospicularis*, *Grosspiculagia lasensis*, *Spiculopteragia spiculoptera* and *Rinadia mathevossiani*; in red deer, *Ostertagia leptospicularis*, *Spiculopteragia spiculoptera* and *Rinadia mathevossiani*; in fallow deer, *Ostertagia mossi*, *Grosspiculagia lasensis* and *Spiculopteragia asymmetrica*. The roe deer is a reservoir host of *Trichostrongylus axei* for domestic animals. A.E.F.

177—KIRYANOVA, E. S., 1958.—[Parasitic nematodes of cultivated and wild plants in the Leningrad region.] Conference on Scientific and Experimental Work on Plant Protection in North-Western U.S.S.R. (11th), November 25–29, 1958, pp. 81–82. [In Russian.]

Kiryanova lists for the Leningrad region the plant-parasitic nematodes which include *Aphelenchoides fragariae*, *Anguina agrostis*, *A. millefolii*, *A. graminophila*, recorded for the first time, and *A. tridomina* n.sp. The new species infests panicles of *Agrostis* at the points of branching, forming most often triple galls. It is nearest to *A. graminophila* and is chiefly characterized by the presence of chitinous reinforcements on the head, a transparent tail tip and the prominence of the male bursa. In live specimens, five pairs of point-like chitinous thickenings can be seen in the oesophageal lumen at the anterior part of the bulb. G.I.P.



178—SOPRUNOV, F. F., 1958.—[Carnivorous hymphomycetous fungi and their use in the control of pathogenic nematodes.] Ashkhabad: Akademiya Nauk Turkmenskoi SSR, 365 pp. [In Russian.]

179—TAYLOR, E. L., 1958.—“Symposium on some lesser-known diseases common to man and animals. (c) Parasitic infestations.” Health Congress (65th) of the Royal Society of Health, Eastbourne, April 28 to May 2, 1958, pp. 176–183.

Taylor considers host-parasite communities which affect the population in Britain. Some represent an ever decreasing infection heading for eradication. *Taenia saginata*, *Echinococcus granulosus* and *Trichinella spiralis* infections are, however, prevalent in a low but steady level of the population and are dependent on leakages that cannot be stopped by the methods now employed.

G.I.P.

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The first issue of this year (1959, Volume 33) contains an up-to-date authoritative account of the genus *Setaria* by Dr. Yeh Liang-Sheng, entitled: "A Revision of the Nematode Genus *Setaria* Viborg, 1795, its Host Parasite Relationship, Specification and Evolution". 98 pp., 186 text figures.

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